TANZANIA ELECTRIC SUPPLY COMPANY LIMITED

KENYA-TANZANIA 400KV POWER INTERCONNECTION PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR 400 KV TRANSMISSION LINE 415 KM IN TANZANIA FROM NAMANGA TO SINGIDA

Submitted to:

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ESIA – VOLUME I FULL FINAL ESIA REPORT

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This report is reviewed by .....

Mallango Ande Samuel (Freelance certified EIA assessor), accompany with a resource person/coordinator Eng. Hamdun Mansur and Damian J. Muhe succeeding the initial ESIA report previously produced by team of expert mentioned in the next page. Further additional studies on Wildlife Ecology, Birds, and Physical Cultural Resources Management Plan (PCRMP) were under taken by the following experts:-

1. Dr. Alfred Kikoti (Wildlife Elephant Center) – Wildlife Ecology

2. Mr. Dominic WCST) – Birds

3. Mr. Emmanuel Sassi – University of Dar es Salaam—PCRMP

The additional full reports have been cited and are submitted as separate reports.

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GENIVAR, 2012. *Environmental and Social Impact Assessment and Resettlement Action Plan of the Kenya-Tanzania Power Interconnection Project. Final Full ESIA* Report presented to Nile Basin Initiative - NELSAP with 236 pages and appendices.

LIST OF ABBREVIATIONS AND ACRONYMS

AACC	Aluminium Alloy Conductor
ACZ	Agro-climatic Zone
AfDB	African Development Bank
AMREF	African Medical and Research Foundation
ASALs	Arid and semi-arid lands
BP	Bank Procedures
bp	Before present
BPO	Business Process Outsourcing
CBOs	Community Based Organisations
CMS	Convention on Conservation of Migratory Species of Wild Animals
CNH	Critical Natural Habitat
CPP	Consultation and Public Participation
DEC	District Environmental Committee
DED	District Executive Director
DLB	District Land Board
DOE	Division of Environment
EA	Environmental Audit
EAC	East Africa Community
EAPP	East Africa Power Pool
EARG	East Africa Resource Group Limited
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMCA	Environmental Management and Coordination Act
EMF	Electro-magnetic Field
EMP	Environmental Management Plan

EPZ	Export Processing Zone
ERB	Electricity Regulatory Board
ERC	Energy Regulatory Commission
ERMIS	Environmental Research, Mapping and Information Systems in Africa
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FGM	Female genital mutilation
GDP	Gross Domestic Production
GHG	Greenhouse Gas
GIS	Geographic Information System
GSW	Galvanized Steel Ground Wire
GTZ	Gesellschafet für Internationale Zausammenarbeit
ICROSS	International Community for Relief of Starvation and Suffering
ICT	Information and Communications Technology
IDPs	Internally Displaced Persons
IPDP	Indigenous (Vulnerable) Peoples' Development Plan
ILRI	International Livestock Research Institute
IPPs	Independent Power Producers
IUCN	International Union for Conservation of Nature
JICA	Japanese International Cooperation Agency
MSA	Middle Stone Age
	MTP Medium-Term Plan
MYWO	Maendeleo Ya Wanawake Organization
NBI	Nile Basin Initiative
NCA	Ngorongoro Conservation Area
NCAA	Ngorongoro Conservation Area Authority
NCCK	National Council of Churches in Kenya

NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NEMC	National Environmental Management Council
NEP	National Environment Policy
NGOs	Non-Governmental Organisations
NHSDP	National Human Settlements Development Policy
NLC	National Land Commission
NLTF	National Land Trust Fund
OP	Operational Policy
OPD	Out Patient Department
OPGW	Optical Ground Wire
OSBP	One-Stop-Border-Post
PAPs	Project Affected Persons
PCRs	Physical Cultural Resources
PIU	Project Implementation Unit
PMU	Project Management Unit
RAP	Resettlement Action Plan
REA	Rural Electrification Authority
REP	Rural Electrification Programme
RI	Resettlement Instrument
RoW	Right of Way
SEA	Strategic Environmental Assessment
SEO	Site Environmental Officer
TANESCO	Tanzania Electricity Supply Company
TL	Transmission line
TNP	Tarangire National Park
US	United States
USAID	United States Agency for International Development
VESC	Valued Environmental and Social Component

VPO	Vice-President Office
WB	World Bank
WMA	Wildlife Management Area
WRMA	Water Resources Management Authority

ACKNOWLEDGEMENTS

TANESCO wishes to express their gratitude to the ESIA review teams for the production of the ESIA review reports for this project. Also from the aid of government institutions consisting of Local Governments where transmission line traversed, NEMC TAC team and lenders who reviewed the draft report and submitted comments to improve and shape this final ESIA report. Comments and concerns from stakeholders, including project affected people, individuals, members of NGOs and CBOs were also very valuable and were integrated to this report. The inputs of first consultants GENIVAR EARG who did initial report with others whom our consultant met during our field site verification; TANESCO thank all of them for their generous contribution, expertise and resources, which were essential for the production of this report.

Finally TANESCO wish to express their recognition to NELSAP officers for their support, guidance and financing the review study.

EXECUTIVE SUMMARY

ES 1 INTRODUCTION

The Governments of Kenya and Tanzania, under the auspices of the Nile Basin Initiative / Nile Equatorial Lakes Subsidiary Action Programme (NELSAP), have carried out a feasibility study and detailed design for a power line to interconnect the power grid systems of Kenya and Tanzania. The whole study consists of Feasibility Study, Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP), Detailed Design and Tender Documents of the Kenya – Tanzania Power Interconnection. The study is composed of two consultancies:-

i. Feasibility Study and Detailed Design

ii. ESIA & RAP. GENIVAR was given the mandate of conducting the ESIA & RAP studies for the 400 kV transmission line extending between Isinya (Kenya) and Singida (Tanzania).

iii. Mallango Ande an independent EIA expert has reviewed part of the ESIA and RAP studies i.e. from Namanga to Singida to suit the Tanzania Environmental Management Act, 2004 and 2005, EIA Regulation; it's an extract of the main report with some few addition and changes after field authentication.

The general objective of the project is to increase transit capacities and flexibility of operation of joined 400 kV interconnection grids and to improve sustainable electricity supply in Kenya, Tanzania and the East Africa Power Pool (EAPP). The interconnection project will enhance economic and social development in the region by improving quality and increasing energy availability. The project will provide a more sustainable energy supply for both countries and will increase power supplies to areas deficient electricity. The project will then help reducing the duration and frequency of power interruptions in both countries including Nairobi, Isinya, and Arusha, Manyara, Dodoma and Singida regions. It will help reducing power system and technical losses to meet the existing and increasing power demand in the whole area.

The ESIA report presents the outcomes of the environmental and social impact assessment on the selected final corridor route of transmission line, proposed substation at Arusha (Kisongo) and road construction of 5km from A to Z industry junction to the proposed Kisongo substation (Lemugur Village). The report consists of eight main chapters embracing introduction; scope and objectives of the ESIA as well as the methodology; review of the corridor alternatives and description of the selected corridor; Tanzanian institutional and legal framework; consultation activities; existing environmental and social conditions; potential environmental and social impacts; environmental and social management plan, monitoring plans, cost benefit analysis ;decommissioning as well as budget and cost estimates; and finally, conclusions and recommendations.

ES 2 PROJECT DESCRIPTION

Line Route and Corridor Alternatives

At the stage of the preliminary study, different corridors were compared except for the section from Isinya to Arusha for which the Terms of Reference focused on

reviewing the line route proposed by BKS-Acres in 2002. A local optimization of this line route was however carried out during this detailed study, in collaboration with RSWI, in charge of the Detailed Design and Tender Documents. This final optimization has made to avoid the most sensitive elements, such as schools, churches, cultural and ritual sites, sensitive ecosystems etc., and to minimize the need to construct new access tracks. Between Arusha (Kisongo substation) and Singida substations, three corridors (A-B-C) were compared. The criteria used for the design and the selections of the least impact corridor were:-

Technical: topography, watercourses, soils, access, poorly drained and floodable sectors, airports, power line and road crossings, number of angles, etc.;

Environmental: vegetation, protected areas, main watercourses, birds and mammals migratory corridors, fauna reproduction areas, etc.;

Socioeconomic: number of villages affected, tourism infrastructure (lodges, etc.), permanent agriculture (coffee, fruits, etc.), pastoral land/ranch, tree plantations, military infrastructures, etc.

For technical and environmental reasons the reviewer visited Corridor B which was preferred initially by the GENIVA due to its direct route from the proposed Kisongo substation to Singida substation. For about 207 km of the 301 km between Arusha and Singida, the proposed corridor follows the existing 220 kV transmission line, which reduces environmental and social impacts. On this portion of the transmission line, the width of the corridor will be reduced from 90 m to 70 m. Corridor B is also the shortest alternative with the fewest number of angle points and least amount of technical constraints and problematic zones, therefore costs associated with this option should be less.

Corridor B had the positive environmental and social intrinsic worth identified during stakeholders meetings.

The length of the selected transmission line corridor is about 415 km are in Tanzania i.e. from Namanga to Arusha is 114 km and from Arusha to Singida is 301 km.

ES 3 PROJECT COST AND SCHEDULE

The total project cost calculated in June 2012 value and allowing for 5% physical contingency and using an average inflation of 5% per year is estimated at 191 M USD for Tanzania. It excludes the cost for the mitigation program for environmental and socio-economic impacts of the project, compensation for the loss of permanent and temporary assets and livelihood restoration

ES 4 ESIA REQUIREMENTS

This ESIA is aimed at meeting fully the requirements of the Tanzanian Environmental Management Act CAP 191, its Environmental Impact Assessment and Audit Regulations of 2005 and all relevant policies, administrative and legal framework, but also to meet international requirements such as those of The World Bank, JICA, AfDB and the International Finance Corporation

ES 5 PUBLIC CONSULTATIONS

As part of ESIA process public participation and consultation was conducted with different stakeholders in order to influence and share their views with regard to the

proposed project. The aim is to spread project information and incorporate the views of project affected people, provides opportunities to avoid and resolve disputes and reconcile conflicting interests; and Enhances transparency and accountability in decision making and enables the applicant to incorporate the needs, preferences and values of affected parties into the activity;

Public meetings with communities around the sites including the Lemugur village where the Arusha substation will be located were essential part of this Environmental and Social Impact Assessment. In the public consultation process the following two types of consultations were considered:

- Consultations with District and Local authorities; and
- Consultations with communities within the vicinity of proposed project area and along the transmission line way leave.

The key stakeholders included Local Government Authorities in Municipal, District Councils, Sector Ministries, Regional Authorities, NGOs, the Village communities close to and along the proposed transmission line route.

ES 5.1 Public views

Majority of government institutions and village communities along the transmission line, access road to the proposed Kisongo substation and Lemugur village are positive with the project development as they started to hear about this project long time now they need action on the ground. Also they wanted to know what benefits they are going to get during the construction of the project and operation phases including the opinion that social benefit like school, dispensary, roads, village office construction, income generating activities and electrification should be considered. Compensation should be prompt, transparent and adequate for those who will be affected by the project land acquisition to establishing a new life after relocation.

ES 5.2 Consultation of Project Affected Persons

A face-to-face interview was conducted with the head of household or another adult member of the household for affected people along the proposed transmission line, access road to lemugur and lemugur villagers where the proposed Kisongo substation will be constructed. Socio-economic information was collected about household members, livelihood, income and production, land ownership, livestock, crops, trees, as well as principal and secondary structures. Concerns rose about the wayleave and how the transmission line project could affect the households were also gathered. A total number of people consulted were 574 for the transmission line,substation area and access road. While the Project Affected People (PAPs) were 518 for transmission line and 37 people for substation area.

ES 6 ENVIRONMENTAL AND SOCIAL IMPACTS

ES 6.1 Impact identification and analysis

Impact identification was through the knowledge of activities involved and experience of the experts in similar projects. Features of the similar projects and activities involved are described below. The significance of impacts shall be based on their severity of the impact to the natural and social environment and their

importance. Consideration was made to the compliance of the existing laws, standards, conventions and treaties.

On the other hand analysis of the potential positive and negative impacts is based on magnitude identification and significance criteria such as extent or spatial influence of Impact, magnitude of impact at that spatial scale reversibility, impact duration and phase, rating (low, medium high and severe), to evaluate adverse impacts on natural resources, ecological functions, species diversity, depletion or fragmentation on flora and fauna habitat, loss of threatened, rare or endangered species and alterations in predator-prey relationships

The criteria used to evaluate the significance of adverse social impacts that result from biophysical changes include threats to human health and safety e.g. from release of persistent and/or toxic chemicals such as oil, decline in commercially valuable or locally important species or resources e.g. wildlife, birds, forests and farmland, loss of areas or environmental components that have cultural, recreational or aesthetic value, displacement of people, disruption of communities by influx of a workforce e.g. during project construction and pressures on services, transportation and infrastructure

It is anticipated that the construction of 400kV transmission line, access road and substation projects will have both potential positive (beneficial) and negative impacts on physical, biological and social environment to the people and surrounding environment in the project areas. Also impacts will be from site clearance (preparation), transportation and storage of equipment and construction materials.

ES 6.2 Impacts on biophysical environment

The main impacts on the biophysical environment are the permanent loss of vegetation in the ROW and the permanent loss of small portions of wetlands required for the construction of towers. Other impacts, such as dust emissions, noise, soil erosion, degradation of water quality, soil contamination by poor waste management or accidental spill of hydrocarbons, as well as disturbance and displacement of wildlife habitats, may occur during construction, maintenance and decommissioning works but will be very limited and of temporary nature. Mitigation measures have been proposed to minimize or compensate for adverse impacts. These measures include, among others, minimizing vegetation clearing, avoiding construction through wetlands as much as possible, progressive restoration of construction sites, taking into account bird breeding, roosting areas and wildlife migratory patterns and prevent construction during specific periods.

ES 6.1.1 Impact on wildlife and birds corridors

Both large and small mammals as well as birds are mainly found in wildlife sanctuary, also crosses the transmission line near wetlands, game controlled areas and national parks located in the project area. Common wildlife in these protected areas include elephant, wildebeests, zebras, elephants, elands (*Taurotragus oryx*), giraffes, Grant's gazelle (*Gazella grantii*), lions, cheetahs, leopards, hyenas, impalas (*Aepyceros melampus*) and buffalos (*Syncerus caffer*). Rare species such as oryx (*Oryx* sp.) and lesser kudu (*Tragelaphus imberbis*) can be seen in some areas, particularly in Ngorongoro Conservation Area and Tarangire National Park. Rhinos can also be seen in Ngorongoro Conservation Area.

Primates, small mammals, reptiles, amphibians as well as woodland and forest birds can also be spotted in the project area. However, outside protected areas, wildlife populations are low but are generally highly visible owing to the nature of the terrain and season. Finally, aquatic birds such as Egyptian geese (*Alopochen aegyptiacus*), Greater flamingo (*Phoenicopterus roseus*) and many other water birds are commonly seen on wetlands and on Lakes Natron, Manyara, Babati, Bassotu, Tlawi and Burunge.

It should be noted that the transmission line do cross protected areas in Tanzania specifically the Game controlled arreas and Wildlife Management Area (WMA's). Also crosses three migration corridors: the Amboseri, Kilimanjaro-Lake Natron corridor, the Manyara Ranch – Lake Natron corridor and the Tarangire-Manyara (Kwakuchinja) corridor.

ES 6.2 Impact on social environment

The main social impacts are the permanent loss of arable land due to the presence of access roads, substation at Lemugur village (160,000m^2) and tower bases, and the restriction of planting species without the potential to grow beyond 5 m at maturity in the ROW. In addition to these impacts on agricultural activities, a significant impact will be the relocation of houses and some public or private infrastructure such as schools, mosques, churches, shops, etc. In most cases, these will be relocated on another part of the same land, to an adjacent land plot or elsewhere as may be desired by the affected households in collaboration with the relevant authorities. In Tanzania, the project is affecting 553 households both transmission line and substation area at Lemugur of which 221 will need to relocate their houses. Twenty-three community building (school, churches, mosque, etc) will also have to be relocated.

ES 7 POSITIVE IMPACTS

The new transmission line may also lead to positive opportunities for project affected persons and communities. These opportunities may be presented in the form of temporary employment during the construction, operational and maintenance, decommissioning phases, as well as through income generated activities and opportunities, such as sale of food and other consumables to migrant workers among others. Another positive impact resulting from this project is the improvement of existing access roads for construction needs. If these roads are well maintained during construction and delivered in a good state at the end, the communities along the transmission line might benefit from a better road network.

ES 8 NEGATIVE IMPACTS

Construction activities on the infrastructures including transmission line, substation and access road will disturb the physical i.e. geology and soil, biological i.e. vegetation and fauna, human environment i.e. resettlement and land resources as well as farms. It may also discharge some liquid effluent such as oil on the site that can degrade soil quality. There will be also noise, traffic, air quality (dust) and electrocution and collision impacts resulting from construction and operation of the power line. However, these impacts are medium to low and they can be mitigated.

The project will involve the relocation of people in the course of implementation of this project. TANESCO will make sure that management of construction works including information dissemination, awareness raising with regard to project activities, consultation and planning is implemented. On compensation fair and

transparent using government laid procedures and lenders safeguards are taken on board. There is a possibility of the project to attract people during implementation because of employment expectations. The influx of people may result into social conflicts, pressure on existing infrastructure and increase of health risks (i.e. spread of diseases such as HIV/AIDS).

ES 9 ENVIRONMENTAL MITIGATION MEASURES

The identification of appropriate mitigation measures is an important aspect of this ESIA. Many of the potential impacts identified can be eliminated or reduced through implementation of appropriate mitigation measures either at a strategic planning level or when applied to specific project tasks and activities.

The proposed transmission lines are large linear structures in the landscape and the scale of the development is difficult to mitigate. The constructions of the line, substation and access roads and its operation have potential to create a range of other environmental and social impacts. The most effective means of mitigating these impacts is through careful routing and planning, that is to say reducing the impact before it occurs.

In order to reduce the significance of these impacts and maintain the social and environmental integrity of the project areas and to ensure project sustainability, proposed mitigation measures will be fully implemented and monitored by TANESCO.

ES 9.1 Summary of Mitigation Measures

Mitigation measures presented have been defined with due consideration of the baseline and the predicted impacts of the project. The impacts are specific to the project and the conditions identified along the proposed project area and route alignment.

Mitigation measures have been presented for the proposed transmission line, substation access road projects, for predicted impacts during the construction and operation phases. In general, three broad categories of mitigations were considered namely, bio physical and social.

Many social measures have been proposed to minimize or compensate for adverse impacts and to maximize positive impacts. These measures namely include encouraging the practice of compatible agricultural and beekeeping activities within the transmission line ROW and planning maintenance work outside of the growing and grazing season. Potential negative impacts of the new transmission line on communities or persons and on private or common property assets can also be prevented or minimised by an adequate preparation. Elaboration and implementation of adequate programs for compensation and resettlement, as presented in the separate RAP report, will minimise potential impacts on social and environmental components.

ES 10 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

An Environmental and Social Management Plan (ESMP), is one of the important elements of an Environmental and Social Management. This ESMP will ensure that mitigation measures are effectively implemented during the construction, operational and decommissioning phases of the project provide a check or evaluation tool on implementation of proposed mitigation measures and EMP

recommendations as well as Identifying corrective measures or redesign of mitigation measures, if the originally planned mitigation measures are not sufficiently effective. Monitoring plans are proposed for surface water quality, drinking water quality, air quality, noise levels, soil erosion, evolution of fauna and wetlands, bird strike mortalities, communities' health, social and economic benefits for local communities. The ESMP also provides orientations on training and capacity building requirements for its sustainable implementation.

Make sure that all proposed mitigation measures are implemented on right time with specified responsibilities and costs

Developer, Consultants, Contractors, and Local Authorities shall be responsible for implementing ESMP and its Monitoring Plan, as well as preparation of reports and evaluation of gathered data. Developer has set aside a tentative fund in the tune of 1. 0M USD for implementation of ESMP for the project and another 951000 USD as annual monitoring costs.

Table 1: Environmental and Social Management Plan

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
Soil quality	Preconstruction Construction Operation Decommissioning	• Construction of access roads, substation and tower foundations • Erection of towers • Fuel spills from vehicles circulating in ROW and access roads • Use of chemicals in ROW for maintenance works • Periodic removal of vegetation in ROW • Disposal of waste from construction, operation and maintenance works • Substation	• Degradation of soil quality affecting natural habitats and soil suitability for cultivation • Soil erosion • Degradation of soil quality	• Contractors shall adapt their work schedule to take into account the rainy season; some activities shall be delayed or interrupted during the rainy season. • Second containment to contain oil spillage/leakage from transformers • Maintenance vehicles should remain in identified access roads and ROW to avoid damaging soil and vegetation. • Identify and monitor erosion prone areas. Establish and implement erosion-control measures when required: – Prior to construction, install necessary temporary/permanent erosion and sediment control structures. – Access roads along steep slopes should be avoided; roads can be located perpendicularly or diagonally to the slope. – After construction, soil should be levelled and areas stabilized to facilitate vegetation regeneration. – Activities should be carried out in the dry season, especially for wetland areas and water crossings. – Avoid vegetation clearing on steep slopes. – Ensure topsoil is left in a non-compacted condition following completion of works. – Ensure revegetation at the earliest time. – Where erosion occurs on steep slopes, river banks, etc., all exposed soils should be rehabilitated immediately following construction activities. Grass shall be seeded or other measures implemented depending on slope (*e.g.* installation of silt fences). • Strip and save all available topsoil from within the ROW and all	Transmission line RoW, substation area and access roads	Minor	T3, T4, T12	Contractors, supervised by PMU's TANESCO Environmental Unit	Cost to be covered by contractor as part of works to be executed

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				ancillary sites, including burrow pits, and make beneficial reuse for site rehabilitation. • Promote mechanical maintenance techniques in ROW, rather than the use of pesticides. • Establish a protocol for pesticides use and storage, promoting a safe and efficient management of these products. • Ensure sound management practices for dangerous products and solid wastes. • Ensure that construction, operation and maintenance teams have access to a spill kit at all times.					
Surface water and sediment quality	Preconstruction Construction Operation Decommissioning	• Construction of access roads, substation and tower foundations • Erection of towers • Spills of chemical products or fuel used for preconstruction, construction and maintenance works • Vegetation removal in ROW for construction and maintenance • Inadequate maintenance of access roads' culverts and bridges • Disposal of waste from construction, operation and maintenance works	• Contamination of runoff or surface waters • Modification of aquatic habitats and/or species in water bodies • Erosion and sediments transport to water bodies	• Limit vegetation removal and drainage patterns alteration. • When applicable, remove backfill from the swamps/wetlands when tower erection is completed. • Survey and peg the designed drainage work prior to construction. • Construct all designed drainage works prior to, during or immediately following excavation work in order to minimize erosion. • Inspect all works and ancillary sites for drainage and erosion problems after each major storm events during the period of construction. Repair all failed drains and take other appropriate actions. • When possible, schedule works requiring large areas of soil disturbance or river crossings to avoid the rainy season. • Promote mechanical maintenance techniques, rather than the use of pesticides. • Establish a protocol for pesticide use and storage, promoting a safe and efficient management of these products. • Ensure sound management practices for dangerous products and solid wastes. • Prepare a waste management plan, including the provision of an appropriate number of toilets at worksites. • Identify and monitor erosion prone	Major water bodies and streams in the ROW	Minor	T3, T4, T7, T12	Contractors, supervised by PMU's TANESCO Environmental Unit	Cost to be covered by contractor as part of works to be executed

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				areas, including access roads' culverts and bridges. Establish and implement erosion-control measures when required such as outlined above. • Avoid the installation of towers in or immediately adjacent to river banks to reduce the potential for soil erosion into the stream. • All necessary measures should be undertaken to prevent earthworks from impeding cross drainage at rivers/streams, irrigation canal, etc. • Install culverts or bridges for temporary and permanent access roads. • Upgrade existing bridges rather than construct new ones. • Maintain a vegetation buffer along both sides of watercourse crossings. • Prohibit construction, operation and maintenance vehicles from driving in watercourses. • Carry out regular maintenance on all vehicles and other machinery used for construction. • Confine vehicle maintenance to specific areas designed to contain any spill of fuel or lubricant. • Ensure that construction, operation and maintenance teams have access to a spill kit at all times. • Collection, storage and disposal at authorised facilities of waste petroleum products and used oils. • Ensure that the Contractor complies with emergency procedures prior to commencing activities on the site.					
Air quality, noise and vibrations	Preconstruction Construction Operational Decommissioning	• Construction of access roads, substation and tower foundations • Erection of towers • ROW clearance and maintenance • Vehicles circulation on access roads and in ROW	• Nuisance to nearby residents, farmers and others users from noise, dust and gas emissions • Disturbance to wildlife species located nearby project activities	• Protection of natural vegetation along the ROW and access roads. • Protection of stockpiles of friable material subject to wind erosion with a barrier, windscreen or vegetation. • Cover loads of friable material during transportation. • Restrict speed on loose surface roads to 25 km/h during dry or dusty conditions. • Enforce vehicle load restrictions to avoid excess emissions from	Access roads , substation and throughout the ROW, especially near communities	Minor	T3, T4, T12	Contractors, supervised by PMU's TANESCO Environmental Unit	Cost to be covered by contractor as part of works to be executed

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
		• Noise from electric/magnetic field surrounding high voltage installations		engine overloading. • Where practical, turn off engines when not in use. • Prohibit uncontrolled burning of woody and plant debris within the ROW. • Restrict construction and maintenance activities to daylight hours. • Maintain machinery and vehicles in order to minimise noise and gas discharge. Undertake regular inspections to confirm that appropriate maintenance is performed. • Limit construction to a period as short as possible. • Provide workers in the vicinity of loud noise with earplugs and limit their working time according to national guidelines.					
Natural habitats and wildlife (including special status species)	Preconstruction Construction Operational Operation Decommissioning	• Construction of access roads and tower foundations • ROW clearance and maintenance • Erection of towers • Physical presence of infrastructures • Poaching • Disturbance from electric/magnetic field surrounding high voltage installations • Periodic presence of workers • Access to wildlife and protected areas facilitated by access roads • Spills of chemical products or fuel used for preconstructio	• Modification of migratory corridors for birds and terrestrial wildlife • Collision and electrocution risks for birds because of the presence of power lines and towers • Degradation of natural habitats and/or species • Disturbance of fauna (including special status species) • Increased poaching due to new access for local people and workers	• Minimize vegetation clearing. • Adjust tower location and span length to minimize the need for tree removal and trimming along forest edges. • Sagging in wildlife corridor should not be less than 10 meters • Mixing of constructed material should be restricted in sensitive ecological areas including corridors and dispersal areas(brought material only prepared from outside) • Camouflage towers/blend to environment (combat like) in corridors to reduce reflection to migrating animals • Anti poaching activities • Avoid construction of the transmission line through wetlands and span wetlands whenever possible. • Where it is not possible to completely avoid wetlands, the use of mats and wide-track vehicles when crossing wetlands is preferable. • Carry out activities during the dry season to minimize disturbance of sensitive soils and problems in flood prone areas. • Use existing roads for construction and operational access whenever possible.	Other mitigation measures throughout the ROW Specific mitigation measures for bullet No. 3,4 5& 6 to be implemented at Tanganyet corridor 3km; Mswakini corridor 2.5km; Jangwani corridor 3.5km; Swagaswaga-Barangida Gendawari corridor 5kms Specific mitigation measures for bullet 6 Strengthening of wildlife department at local councils	Vegetation: minor Fish and aquatic life: medium Terrestrial fauna: minor Birds: minor Endangered, threatened and protected species: undetermined	T3, T4, T5, T6, T7	Contractors, supervised by PMU's Environmental Unit TANESCO Local authority Wildlife division and TANAPA Other development partners to finance the specific mitigation measures	Cost to be covered by contractor as part of works to be executed. Wetland restoration 50 000 $ during construction Survey of endangered species / monitoring of migration corridor used by birds and large mammals, including identification of high risk areas for bird collisions 200,000 U$ Before and during construction Telemetry/ elephant collaring 250 000U$ Support World

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
		n, construction and maintenance works • Disposal of waste from construction, operation and maintenance works		• Regular control of vehicles to prevent introduction of invasive species. • Carefully clean construction equipment after working in areas infested with known invasive exotic species. • Favour mechanical maintenance techniques in ROW rather than the use of pesticides. • Identify and allow tree and shrub species with limited heights of 5m to grow at specified space within the ROW. • Clearly mark the extent of clearing within the approved worksite areas with pegs at 50 m intervals or less. Identify and mark individual trees for retention along a section within the marked extent of clearing. • Inspect and approve all correctly located pegged clearing sites. Vegetation clearance shall only be undertaken once consent has been obtained from each owner. • Trees along the ROW should be protected from machinery. • Identify/monitor wildlife corridor changes to reduce human wildlife conflicts • Rehabilitate ancillary sites as soon as they are not requested anymore, such as borrow pits, camp sites, material storage piles, etc. • Restore sites to their previous state. • Progressively sow all disturbed construction and ancillary site surface with a cover crop mix immediately following final use of each ancillary site. • In wetlands, staging areas, and/or bird migration corridor, install reflectors on the ground wire at intervals along the line to minimize potential bird collisions. High-risk areas must be identified prior to final project design. • In areas of high bird density, use specially-designed towers so that the conductors of the new line are at the same heights as those of the existing line it parallels. High-risk areas must be identified prior					Elephant centre 500,000U$ - during construction Ant poaching program: 60 000$ During construction stage

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				to final project design. • Implement a bird monitoring program in areas where there is a higher risk of bird strike. • Survey of endangered species and monitoring of migration corridor use by large mammals and birds. • Maintain shaded stream areas for aquatic fauna, where possible. • Devise customised measures targeting specific species and/or habitats, if needed. • Inform workers about the regulations related to wildlife protection and conservation areas. • Minimize the number of access roads to the ROW. When possible, proceed to early closing of access roads nearby wildlife and conservation areas. • Noise should be minimized during construction in order that animals in the neighbouring areas are not chased away and land in the hands of hunters. • Take into account migratory patterns and prevent construction during specific period if identified. • Prohibit workers from possessing firearms and other hunting and fishing devices. • Prohibit wildlife disturbance and poaching.					
Land occupation	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads, substation and tower foundations • Erection of towers • Physical presence of infrastructures • ROW clearance and maintenance works	• Loss of arable land • Loss of land for husbandry and grazing • Loss of crops and trees • Disruption of farming activities by operation and maintenance works • Displacement of households, houses and community buildings	• Final survey of all affected assets to update the RAP cost estimates prior to payment of entitlements. • Appropriate valuation of the affected properties should be done both by the property owner and the PIU. • Based on the valuation reports, provide appropriate compensation before construction is initiated and allow sufficient time for the affected households to transfer or reconstruct structures. • Complete all necessary land and building acquisition in accordance with RAP prior to commencement of any construction works. • Encourage the practice of compatible agricultural activities within the ROW.	Throughout the ROW	Houses and secondary structures: medium Community buildings: minor	T8, T9, T10, T11	GoT/ TANESCO TANESCO Environmental committee and PIU	See RAP report for compensation costs to be covered by GoT/TANESCO Update Land use plan 300,000U$ Before and during construction

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				• Plan maintenance works outside of the growing and grazing season. • Provide compensation of a year of harvesting of the area under cultivation in the ROW to all affected households. In addition, crops that may be removed from land to be temporarily used for construction purposes (camps, access roads) will have to be compensated on the same basis (cash equivalent to a year of harvesting). • If soil compaction has occurred, chisel plough the affected soil over successive seasons as needed to break up compaction layers. • Remove all construction debris and leftovers at the end of construction of each portion of the line. • In order to reduce the impact of the project on land and agricultural production, restrict permanent acquisition of land for the ROW (except for the towers) and favour leasing with restrictions on cultivation practices (forbid trees with potential to grow beyond 5 m at maturity). • In collaboration with District Council Revisit land use plan in villages with vulnerable people and ecological sensitive area					stage
Community forests	Preconstruction Construction Operational Maintenance Decommissioning	• ROW clearance and maintenance works • Periodic presence of operation and maintenance workers	• Loss of community forest areas • Disturbance of fauna • Increased poaching due to new access for local people and workers • Degradation of subsistence and income-generating activities related to community forests	• Engagement of affected communities in the planning of construction and maintenance activities in order to mitigate impacts on forests' resources. • Reforestation program to compensate for community forest losses. This program should involve the local population as much as possible in collaboration with the Tanzania Forest Service. In addition, indigenous plant species should be used for reforestation.	Mogithu, Mara, Bagara, Kinyagigi, Mwada, Sigino, Kiongozi, Mawemairo, Mesenanijuu, Vilima vitatu, Kimokowa, Nangwa and Minjingu	Minor	T3, T4, T5	Contractors, supervised by PMU's TANESCO Environmental Unit District Local council TANAPA, Wildlife Division AfDB/JICA	Reforestation program : : 50 000 $) during Construction stage
Infrastructure	Preconstruction Construction Maintenance Decommissioning	• Circulation of vehicles to and from construction	• Degradation of existing roads • Traffic disturbances during construction activities • Construction of Arusha	• In order to minimize inconvenience to road users, the Contractor should be required to implement measures to keep all	Throughout the ROW	Minor	T3, T4	Contractors, supervised by PMU's TANESCO	Cost to be covered by Contractor. As part contract.

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
		sites	substation and 5km access road	roads and accesses affected by the work open and not to obstruct traffic flows and existing accesses at all times. • Compliance with all relevant applicable laws related to transportation. • Regular inspection of access road conditions; traffic-related construction damage to be repaired as soon as practical. • Installation of electric cables over roads should be done during non-peak traffic times to reduce impacts on pedestrians, cyclists and cars. • Planning construction activities should be done in collaboration with local authorities and well in advance to ensure minimal traffic interference. To this end, TANESCO will be responsible for strictly enforcing construction schedules. • Conduct an inventory of all services that will be disrupted during construction. • Liaise and reach agreement with affected landowners, local authorities, public undertakings and local people regarding services to be maintained, temporarily cut and reinstated, including the timing and location of cuts and reinstatements. • Obtain written permission from affected landowners and local people regarding the temporary cessation of services. • Maintain or provide temporary services during construction, including temporary water supplies. • Progressively reinstate or repair all interrupted services to their previous capacity. • Involvement of local population in reconstruction.				Environmental unit	
Cultural Properties	Preconstruction Construction Maintenance Decommissioning	• Construction of access roads and tower foundations • Tower erection • ROW clearance and	• Partial destruction of non-identified paleontological/archaeological sites and/or historical buildings and sites	• Should any archaeological or historic remnants be encountered, construction work should immediately stop along that section, and the relevant authorities should be informed. Any archaeological findings	Throughout the ROW	Minor	T3, T4	Contractors, supervised by PMU's Environmental committee and PIU	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
		maintenance works		should be reported to the national museum authorities. • Affected cultural sites should be properly compensated and/or relocated in accordance with customs and norms of the communities. • Further investigation about actual locations and ceremonies associated with graves, shrines and other properties should be carried out before project implementation. • Raise awareness to foreigners on local culture, norms and values. • Prioritize employment opportunities to qualified Tanzanians. • Encourage the VPs community on the importance of preserving local culture and traditions. • Document VPs cultures • Promote and sensitize the performance of local traditional dances and dramas. •					Archaeological /Vulnerable People cultural and norms monitoring 30,000U$ - During Construction stage
Economic activities	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • ROW clearance and maintenance works • Physical presence of infrastructures	• Business opportunities near camp sites • Temporary or permanent loss of income generating activities • Temporary or permanent damage to structures generating income activities • Temporary or permanent loss of access to income generating resources • Potential resettlement away from actual activities, structures and or income generating resources	• The Contractor should investigate local, regional and national capacity to supply construction materials, goods and services, whenever goods or services are available on a competitive basis, the policy should be to purchase locally. • Adopt procurement policies promoting local products and services, when available. • Final survey of all affected assets to update the RAP cost estimates prior to payment of entitlements. • Based on the valuation reports, provide appropriate compensation before construction is initiated and allow sufficient time for the affected households to transfer or reconstruct structures. • Complete all necessary land and building acquisition in accordance with RAP prior to commencement of any construction works. • Encourage the practice of compatible agricultural and beekeeping activities within the ROW.	Throughout the ROW	Arable Land and farming activities: medium Other economic activities: minor	K1 T3, T4	Contractors, supervised by PMU's Environmental committee and PIU	As part of works to be executed by the contractors See RAP report for compensation costs

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				• Plan maintenance works outside of the growing and grazing season. • Provide compensation of a year of harvesting of the area under cultivation in the ROW to all affected households. In addition, crops that may be removed from land to be temporarily used for construction purposes (camps, access roads) will have to be compensated on the same basis (cash equivalent to a year of harvesting). • If soil compaction has occurred, chisel plough the affected soil over successive seasons as needed to break up compaction layers. • Remove all construction debris and leftovers at the end of construction of each portion of the line. • In order to reduce the impact of the project on land and agricultural production, restrict permanent acquisition of land for the ROW (except for the towers) and favour leasing with restrictions on cultivation practices (forbid trees with potential to grow beyond 5 m at maturity).					
Employment	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • ROW clearance and maintenance works	• Limited number of new job opportunities	• Adopt human resources policies favouring local labour employment. The Contractor should develop and implement a plan to ensure that local residents are given first priority for job opportunities for which they are qualified, before workers from outside the region are hired. Details of specific job opportunities must be released and information provided on application procedures. • Women should be part of the hired local population. • Adopt procurement policies promoting local products and services, when available. • Adopt policies and procedures that comply with national legislation and address all aspects of labour standards	Throughout the ROW	Medium (positive)	T3, T4	Contractors, supervised by PMU's Environmental committee TANESCO	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				relevant to the project as specified by IFC policies. Sub-contractors will be contractually required to comply with labour and health and safety regulations. • Form local decision committees composed of members from Maasaï and Barbaig clans along the proposed line route for local employment matters. This approach worked well during the construction of the Athi River-Namanga-Arusha road and it should be replicated during construction of the proposed transmission line.					
Gender, vulnerable and minority groups	Preconstruction Construction Operational Maintenance Decommissioning	• ROW clearance • Interaction of workers with local communities • Uneven access to new job opportunities • Distribution of compensations	• Increased marginality for vulnerable groups • Sexual harassment • Reduce women's access to agricultural land for subsidence and income generating activities • Temporary or permanent loss of subsidence and income generating activities for Maasaï and Barbaigs • Increased social tensions	• Develop specific employment programs for women, young, poor, and other vulnerable groups. • Establish culturally adapted grievance mechanisms readily accessible to vulnerable groups. • Meet regularly with local community representatives to discuss any community issues related to the project. • Engage with traditional authorities and vulnerable group's representatives in the elaboration of RAP. • Encourage the practice of compatible subsidence activities within the ROW, with a special emphasis on vulnerable groups. • Prohibit child labour. • Give priority to women for jobs related to cooking and cleaning services at worker camps. • Enhance social infrastructures – water supply (drilling of water wells)	All communities along the ROW	Minor	T4	TANESCO; Lenders (JICA/AfDB) Local Government PMU's Contractors	As part of works to be executed by the contractors Water well constructions 59,300U$ for vulnerable group
Health and safety	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • ROW clearance and maintenance	• HIV/AIDS propagation • Higher prevalence of vehicle accidents • Injured PAPs near or on the worksite • Accidents on worksites • Risk of electrocution caused by equipment breakdowns, illegal connections and all	• Educate local population on hazards and safe practices when playing and working near high voltage power lines. • Provide safety equipment to workers. • Support medical kits to dispensaries within way leave • Install warning signs and anti-	Throughout the ROW, camp sites, all communities along the ROW	Minor	T4, T13	TANESCO LENDERS Contractors (safety equipments)	As part of the contractors mandate Medical support 250,000,U$ including vulnerable

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
		works • Increased traffic • Presence of workers • Physical presence of infrastructures	other forms of unsafe contacts	climbing devices near construction sites and towers. • Erect an appropriate number of lighting arrestors. • Ensure the development of local and regional emergency plans and local major break in case of infrastructure breakdowns, especially near roads or residential areas. • Monitor and control illegal connections. • Devise and implement HIV/AIDS prevention programme. • Organise environmental and safety training for employees. • Preparation of a health and safety plan for workers and impacted communities. • Education and sensitisation of workers and communities on STDs including HIV/AIDS and the dangers associated with construction activities. • Prohibit child labour. • Contractor and sub-contractor should use appropriate vehicles and comply with legal gross vehicles and axle load limits. • Contractor and sub-contractors should minimize road safety hazard and inconvenience to other road users by taking all appropriate measures. • Design and construct the transmission line in compliance to EMF levels set for occupational and human health exposure. • Minimize exposure of the general public to EMF by forbidding construction of business, educational or residential building structures in the ROW. • Incorporate ground wire on top of the line during design to protect the transmission line from lightning strikes by directing lightning ions safely to ground. Lightning is therefore not more likely to strike houses or vehicles close to the transmission line. Shorter objects under or very near the line may actually receive some protection from lightning. • Forbid members of the public from construction areas.					people during construction

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				• Provide emergency fire assembly points at strategic locations, clearly marked. • Enforcement of maximum load restrictions. • Enforcement of speed limits. • Compliance with all relevant applicable laws related to transportation.					
Landscape	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • ROW clearance and maintenance works • Physical presence of infrastructures • Aesthetic of technical design	• Permanent alteration to the landscape • Potential degradation of highly sensitive scenic areas and tourism attractions	• Integration of potential impact on landscape as a key variable in the definition of the corridor route. – Where possible, straight lines are maximized in order that the need for angle towers, which have a more negative visual impact due to their heavier construction, is minimized. – Where feasible, the transmission line route is positioned immediately adjacent to the existing 132 kV line, limiting the visual impact to an already disturbed area. • Way leave management can also mitigate aesthetic impacts by planting vegetation screens to block views of the line, leaving the way leave in a natural state and providing wildlife habitats. • Landscaping all disturbed areas, restoration of all temporary construction work areas. • Existing tracks will be used for construction and maintenance as much as possible.	Throughout the ROW, mainly near tourism attractions	Minor	T3, T4	PMU's Technical committee (corridor's route) Contractors, supervised by PMU's Environmental committee	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
Waste solid and liquid at the site	Preconstruction Construction Operational	• Construction of access roads and tower foundations • Erection of towers and conductors stringing • ROW clearance and maintenance works • Domestic use at substations	Potential contamination of soil and water sources (ground and surface) which may lead to health effects	• Proper waste management procedures should be established • Avoid stockpiling of construction materials • Special areas for damping solid wastes should be established • Use of the designated areas for collection of the waster should be encouraged • Prepare waste management plan	Substation areas, throughout ROW, construction yards and stores	Minor	T3, T4, T7	Contractor workers,, Local Authorities and TANESCO	As part of works to be executed by the contractors
Spillage of hazardous materials		• Use of construction equipments/ motorized equipments		• Adequacy and availability of PPE, including protective clothing and respiratory devices. • Construct and use oil resistant sealing 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 • Store hydrocarbons in oil resistant containments in the field, refuelling of vehicles and machines in the field will be done using portable oil collection pans only. • Use well-maintained equipment and good environmental practices during construction and operation in order to reduce the risk of hydrocarbon pollution;					

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)

Soil Erosion and Landslides	Preconstruction Construction Operational	The construction works associated with the site preparation, vegetation clearance for RoW and erection of the towers on the TL involve minor earthworks which include excavation of foundations, concreting of the excavated pits and backfilling	• Reduce land fertility affecting natural habitats and soil suitability for cultivation	• Proper management of way leave area:
				  • Proper revegetation and reforestation,
				  • awareness raising to prevent bush fire
				• Stabilise the soil mechanically to reduce erosion potential.
				• Take special preventive measures whenever the tower have to be erected in sloping places or near water course,
				• Construction during long rains period should be done with caution to avoid soil from being washed away.
				• Also application of water to the disturbed area will reduce the rate of sheet erosion.
				• Topsoil excavated from pylon foundations should be stored for re use on other areas like rehabilitations of quarries
					Substation areas, throughout ROW, construction yards and stores	Minor	T3, T4, T7	Contractor workers,, Local Authorities and TANESCO	As part of works to be executed by the contractors

Social Impact – Livelihood restoration	Preconstruction Construction Operational	The construction works	Improve social economic of the people along the proposed TL route and substations	• Rural Electrification	All villages along proposed TL routes / substation area at Arusha	High	T1 and T2	TANESCO and Lenders	Cost and villages to be electrified to be decided after project appraisal
Social Impact – Livelihood restoration	Preconstruction Construction Operational	The construction works	Improve social economic of the people substations near Arusha S/S	• Water supply • Electrification • Construction of 5km access road	substation area at Arusha	High	T1 and T2	TANESCO and Lenders	Water supply at substation 148,000U$ during construction

Note:

T1 - Electricity Act, 2008
T2 - Rural Energy Act, 2005
T3 - Environmental Management Act, 2004
T4 - Environmental Impact Assessment and Audit Regulations, 2005
T5 - Forest Act (2002)
T6 - Wildlife Conservation Act (1974)
T7 - Water Resources Management Act, 2009
T8 - Land Act, 1999
T9 - Village Land Act No. 5 of 1999
T10 - The Land Regulation (2001)
T11 - The Land Disputes Courts Act No. 2 of 2002
T12 - Legal Provisions on Pollution
T13 - The Occupational Health and Safety Act (2003)
T14 - Disclosure Requirements

Table 2: ESMP Implementation Schedule

ACTIVITIES	TIMESCALE (years / months) Year 1												Year 2												Year 3											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Preconstruction phase																																				
Setting-up of PMU's Environmental Committee																																				
Setting-up of PIU																																				
Information and outreach to communities and PAPs																																				
Delineation and pegging of ROW																																				
Parcel Inquiry																																				
Definition of compensation standards involving PMU and PIU																																				
Construction phase																																				
ROW clearance																																				
Compensation payments to PAPs																																				
Restoration of income generating assets																																				
Supervision and monitoring of mitigation measures' implementation																																				
Setting-up of CSRF																																				
Operational and maintenance phase																																				
ESMP performance assessment																																				
CSRF performance assessment																																				

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CHAPTER ONE

1.0 Introduction

1.1 Project Background

The Governments of Kenya and Tanzania, under the auspices of the Nile Basin Initiative /Nile Equatorial Lakes Subsidiary Action Programme (NELSAP), have intended to carry out a feasibility study and detailed design for a power line to interconnect the power grid systems of Kenya and Tanzania. The whole study is consisting in Feasibility Study, Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP), Detailed Design and Tender Documents of the Kenya – Tanzania Power Interconnection. The study is composed of two consultancies: (i) Feasibility Study and Detailed Design and (ii) ESIA & RAP.

The 400 kV transmission line (TL) will extend from Isinya substation in Kenya to Singida substation in Tanzania via Namanga. The length of the TL is about 505 km (Isinya – Arusha = 204 km and Arusha – Singida = 301 km) with about 90 km in Kenya and 415 km in Tanzania (Map 2.1).

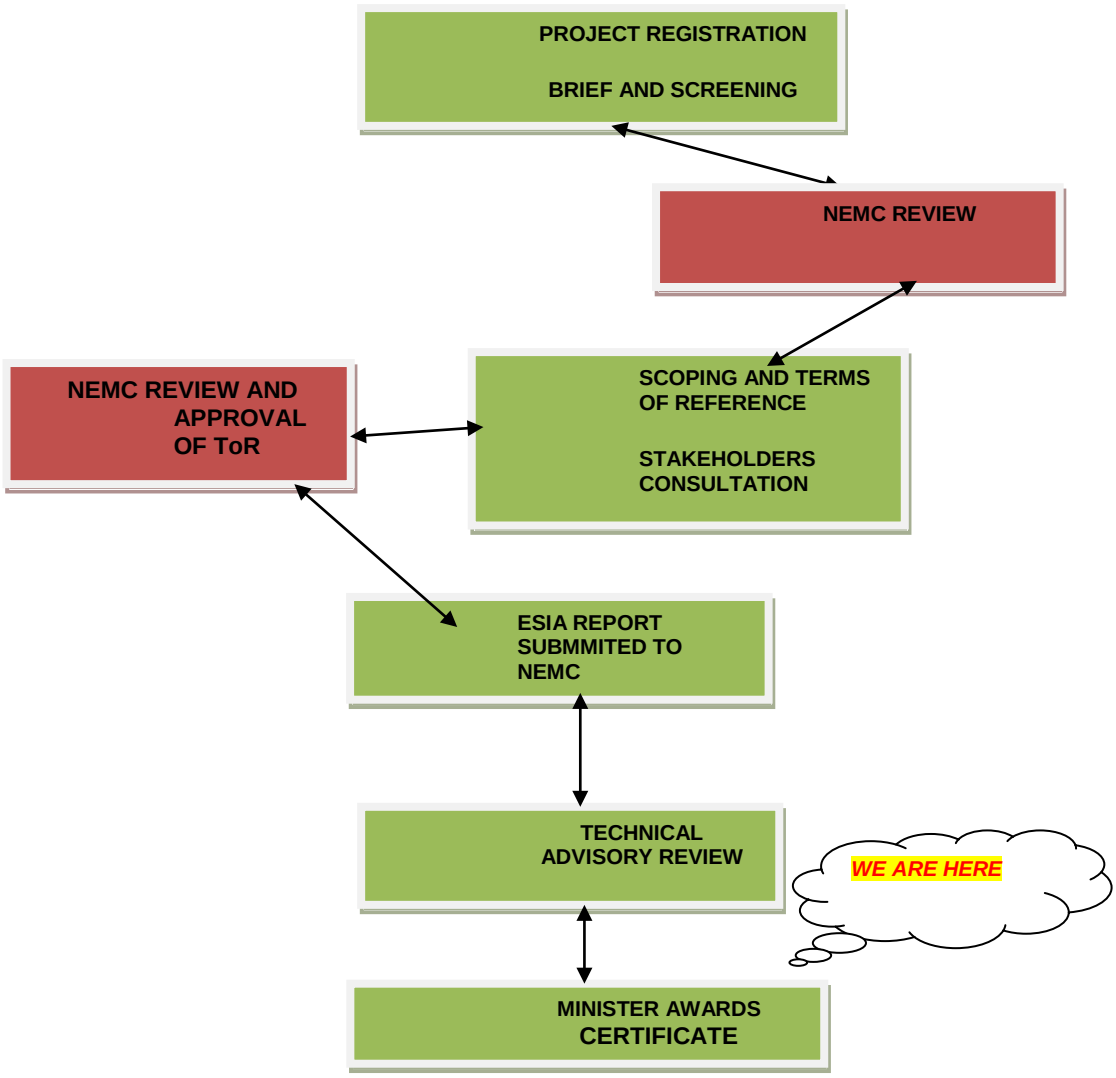


Figure 1: EIA process flow chart of ESIA

GENIVAR, was responsible for the second consultancy, has worked in close collaboration with the Consultant in charge of the feasibility study. Particularly, during the prefeasibility study, the corridor analysis has been carried out in close cooperation to select the best corridor from the technical, environmental and social considerations.

The proponent for this project is TANESCO Authority of P. O Box 9024, Dar es Salaam, and Tanzania. This report was reviewed by Mr. Ande S. Mallango (Certified Registered Environmental Assessor) as consultants hired by TANESCO associated by TANESCO Environment official, Eng.Hamudin Mansur. Resource persons inclusive Mr.Ellia Maiki District Lands, Natural Resources and Environment Longido Council; Suya Hassan Principal Assistant Forest Officer Singida, and Goodluck Lekuya a Masai diligent botanist a resident of Makuyuni.

The category of this project is identified in the first schedule of EIA and audit guidelines 2005 (G.N 349) made under Regulation 6(1), section 7(i) as a project in type A. thus under such projects Full EIA is mandatory. The 407km project crosses different areas stratified in six categories:-

Table 3: General Ecological Stratification of the Project Site

Zone/area	Type of vegetation	RoW corridor
Namanga	Closed stunt acacia	pass sparse less 10
Oldonyosambo Arusha Substation to Mti mmoja **Magugu katesh to 30km before singida**	farm land maize field, woodlots, commercial coffee farm, patches of open grassland Pad, maize ,sunflower peas with sorghum respectively	pass away residential >100 people /km^2
Mti mmoja makuyuni Minjingu	meagre bush land with baobab	< 10 people km2
Mijingu Manyara ranch Magugu	acacia palm woodland	< 10 people km2
katesh scarp ,10km	Acacia woodland	
30km from singida	stunt disturbed miombo woodland <4meters	<80 people /km^2

The aims of the environmental activities at this stage have been to identify and compare alternative possible corridors, to ensure the environmental and social acceptability of technically viable line routes and to create a basis for implementation decisions.

This approach has allowed considering environmental and socio-economical issues at the beginning of the project, during corridor analysis. This proven approach avoids repeated corridors assessment and accelerates the definition of acceptable corridors. The different alternatives were presented to the PMC in Dar es Salaam (13-14 April 2011). The main conclusion of this meeting was an agreement on the corridor recommended by RSWI/GENIVAR.

1.2 Scope and Objectives of the ESIA

According to both countries legislations and the World Bank procedures, the Project requires an Environmental and Social Impact Assessment (ESIA) including an Environmental Management Plan (EMP) and a separate Resettlement Action Plan (RAP).

The general objectives of the ESIA are:-

- To identify the potential positive and negative environmental and social impacts of the interconnection;
- To develop an environmental and social management plan (ESMP) including measures to mitigate the impacts and a monitoring program.

This final ESIA has been developed on the basis of the proposed transmission line assessment, detailed survey and consultations of impacted households and communities, supported with existing secondary data. Stakeholders on various administrative levels and non-governmental organizations (NGOs) have been consulted. The results of these consultations are included in the report and summarized in Chapter 4.

During the environmental and social impact assessment, the attention was focused on the following:

- Impact on the flora and fauna;
- Impact on protected areas;
- Impact on the drainage and water resources;
- Impact on property, settlements and community facilities;
- Impact on land use and agriculture;
- Impact on tourism;
- Impact on landscape.

- Impact on social, economical and traditional/ culture

The initial ESIA prepared by GENIVAR was reviewed in concordance with the Tanzania EIA guidelines, as well as the policies and procedures

of the World Bank (WB) (see Chapter 3). The review was inevitable due to some extent that there are gaps between Kenya and Tanzania's laws and the Bank's safeguard policies, the requirements of the host country, Tanzania applies to this project report.

1.3 Evaluation Methodology

In the course of the ESIA for the Kenya-Tanzania interconnection project, the team of consultants:

- Collected, reviewed and analysed relevant information from different sources including local government (technical services, local authorities);
- Visited the line route;
- Performed detailed socio-economic surveys;
- Consulted people and communities affected by the project, the local, regional and national authorities and CBOs/NGOs;
- Identified environmental and social positive and negative impacts;
- Analyzed the impacts on basis of recognized criteria and methodology and proposed mitigation measures against negative impacts and optimization of positive impacts;
- Developed a programme to compensate losses.

The detailed socio-economic survey was carried out along the proposed transmission line right-of-way (ROW). This work allowed drawing up a precise socio-economic profile of the various Project's affected areas, households and communities.

The study focused on a participatory method in order to integrate opinions from the different stakeholders and record their concerns.

The Arusha substations and 5km access road connecting near "A to Z" industry study has been included to this report and its mitigation plan presented in the ESMP.

The existing Singida substation was studied and general recommendations were presented in the following report: Environmental and Social Impact Assessment (ESIA) for the Proposed 400 kV Power Transmission Line Iringa – Dodoma – Singida – Shinyanga.

The local Consultancy ToR was specifically (using the GENIVAR study); review and by sampling verify the Namanga –Arusha Singida RoW, fill gaps arose and organise the findings in accordance with the EMA 2004 and 2005 EIA regulation Guideline Acceptable by NEMC.

1.4 CONSULTATIONS

1.4.1 Stakeholder Identification and Method of Participation

1.4.2.1 Stakeholders participation

Section 89 of the EMA No. 20 of 2004 provides guidance on public participation issues and states its importance in the ESIA process. Regulation 17 of the EIA Regulations (URT, 2005) provides further directives and procedures for public participation. Stakeholders are all those with a stake in the outcome of a project who participate in decisions on planning and management of the proposed development. Stakeholders share information and knowledge, and may contribute to project activities. Stakeholder involvement is essential in the RAP process. For this project, stakeholders was given a broad definition to encompass all different government agencies, private sector, individuals, CBOs, commercial companies, and all other formal or informal groups.

1.4.2.1 Notification to Stakeholders

Introduction letters were written by TANESCO's Head office to all relevant Regional Administrative Secretaries to first inform them about the project as well as to secure permission to work in the respective districts. These letters were then channelled to the District Executive Director (DED) for the same purpose and to seek appointments to consult the district officials and to undertake consultations in the respective villages. Letters from the DED offices were then distributed to all relevant wards, hamlets, and villages in the rural setting to secure appointments with village government officials as well as local communities. The general public was also notified on the project through meetings and information delivered through their respective village leaders and officials.

Stakeholders and leaders from the Arusha, Manyara and Singida regions were notified in the essence to regional officials directed and close monitor their respective districts of Arusha, Monduli, Longido for Arusha region; Babati District, Babati Municipal and Hanang for Manyara region and Singida municipal and Singida rural for Singida region. After, the team obtained permits and introduction letters for all villages to be affected by the project. These villages were then notified about the consultation exercise.

The team also consulted various stakeholders including NGOs and CBOs dealing with community development, women development, land and environmental issues, natural resource management and HIV/AIDS program operating within the project area. These consultations intended to generate information on women rights and participation in projects and decision making process, obtain views on how to involve all members of the society, especially marginalized groups such as women, widows, disabled and elders that are considered vulnerable with regards to compensation and resettlement issues. Consulted NGOs include: World Vision, AWF, AFRICARE, Mount Meru Community Based Conservation Organization (OSOTWA) and Engender Health, whereas CBOs consulted include BURUNGE CBO and Korongoro Integrated People

Oriented to Conservation (KIPOC). Similarly government agencies such as District Officials, Ministries such as that of Energy and Minerals, Natural Resources and Tourism, Ministry of Defence, Ministry of Health and Social services, Tanzania Civil Aviation Authority, Ministry of Water and Irrigation, as well as the Ministry of Lands and of Human Settlement were consulted to obtain their views regarding the proposed project.

The list of people met during the regional and national stakeholder meetings is presented in Table 4 and 5 and the attendance sheets at village level are presented in ESIA volume III.

Table 4: List of Stakeholders Met during the Regional and National Stakeholder Meetings in Tanzania

Organization	Name	Position
Stakeholders meetings – 20th January 2011 - 20th February 2011		
Tanzania National Parks	Joseph Kessy	Principal Planning Officer
African Wildlife Foundation	Mulengeli Binamungu	Coordinator
Longido District Council	Jacob Lyimo	Environmental Officer
	Elia S. Maika	LNREO
	Stephen Laizer	District Game Officer
	Beatrice Tengi	Community Development Officer
Longido Community Integrated Programme (LOOCIP)	Peter R. Mushad	Project Coordinator
Arusha District Council	Wencilaus Mtui	District Land Officer
Arusha Municipal Council	Fatuma Kunyonza	Acting Municipal Director
	Mr Kiwera	Municipal Land Officer
	Hanifa Ramadhani	Acting DCDO
Monduli District Council	Geoffrey Ruguma	Acting DED
	Twalib Mbasha	DCDO
Babati Municipal Council	Julius Maira	Acting DED
	Mtalemwa Leusi	Planning Officer
	Mary Omary	Sociologist
Babati District Council	Hassan Lugendo	Acting DED
Singida District Council	Pascal Mabiti	District Commissioner
	Enuminata Mwenda	DED
Karatu District Council	Mr Maro	DLNRO
	Stanley Mruma	DEMO

Organization	Name	Position
Kondoa District Council	Obadia Mwakasitu	Authorized Land Officer
	Mselem Rashid Aziz	Community Development Officer
Kiteto District Council	Ally R. Zuberi	Valuer
	Daud T. Msinge	Land Officer
	Kulwa J. Mrisho	Community Development Officer
Simanjiro District Council	Baltazari Sulle	Land Officer
	Invocavity Nyaky	Land Surveyor
	Kaanach M. Kaaya	District Community Development Officer
TANESCO	Maneno Katyega	Senior Manager Strategic Planning and Projects
	Mr. Brown	Principal Transmission Engineer
	Brigita Sylvester	Environmental Officer
	Hamis Boby	Senior Land Surveyor
	Said Chilima	Principal Planning Engineer
	Neema Mushi	Transmission Engineer
Ministry of Lands and Human Settlement	Joseph Kleruu	Principal Valuer
	Raphael Chiremeji-	Valuer II
Ministry of Natural Resources and Tourism	Revocatus Bugumba	Senior Conservator of Antiquities
	Sikujua Ramadhani	Conservator of Antiquities
Ministry of Defense	Col. M.A Msuya	Director of Contract and Procurement
	Col. E.F Mangole	Director of Land Use and Land Planning
TANROADs	Zafarani Madayi	Senior Environmentalist
	Hamisi Waziri	Project Engineer
Ministry of Energy and Minerals	Salum Inegeja	Energy Engineer
	Petro Marwa	Energy Engineer
National Environmental Management Council	Ms Renalda Mukandara	Principal Environmental Officer
Stakeholders meetings – October 2011		
Ministry of Health and Social Welfare	Zena Mango	

Organization	Name	Position
Tanzania Civil Aviation Authorities	Moses Njovu Grace Kiunsi	Electrical technician Administrative officer
Ministry of Water and Irrigation	Christopher Mbawala	Engineer

Table 5: List of Stakeholders Met during the review and verification Meetings in Tanzania

Organization	Name	Position
Stakeholders meetings – 14th April 2013 - 19th April 2013		
Regional TANESCO Manager Arusha	Eng Genes G. Kakore	Principal Eng Officer
	Eng. Moshi	Senior Eng
Arusha Region Secretariat	Ndossa Anza	Acting RAS
	Julius S. Chiula	Regional Natural Resources advisor
Lemugur village	Public meeting	Village government
Lengijabe village	Emmanuel Loya	Villager
Longido District Council	Elia S. Maika	DLNREO
	Stephen Laizer	District Game Officer
Komukuwa Village council	Miss Mariam Ngurupa	Villager
Namanga ward Executive office	Mr. Jim Lukumai	WEO
Regional TANESCO Manager Manyara	Eng. Aziz	Region Eng
Manyara Region Secretariat	Mbago Ibrahim	Acting RAS
	Tenga Samwel	Principal planning officer
	Samuel Dahaye	AAS Economics cluster
Regional TANESCO Manager Singida	Eng. Martin Sichilima	Principal Eng.
Singida Region Secretariat	Mr. Liana Hassan	RAS
	Ms Aziza R. Mumba	AAS Economic cluster
Singida Municipal Council	Ms Hilda Msele	Acting DED
	J. Mwakalukwa	Municipal Land Planner
	Mr. Suya Hassan	Municipal Natural resources Officer
Singida District Council		District Executive Director

1.4.2.2 Community Meetings

To ensure that all villagers/residents in affected communities were informed about the project, the team conducted public meetings in all the villages to be crossed by the proposed transmission line (Appendix I). The team ensured that women attended and participated to the meetings. The meetings were designed to inform the villagers about the project and its potential associated impacts. Villagers were informed of the positive and negative impacts of the project that included loss of land, possibilities of an increased spread of HIV/AIDS, especially during the construction phase, as well as other environmental and social impacts associated with the proposed project. Villagers were also sensitized regarding their right to be compensated and what could be compensated if they would lose land, crops, and/or houses. Villagers were also given an opportunity to ask questions, raise their concerns and provide information to the team on issues such as availability of land in the village for resettlement purposes, available manpower in the village, developmental project that the power project will support in the village, etc. In a few cases the attendance was low due to different reasons: households were far away in search of green pastures, harvesting, or fetching water.

After conducting village meetings, village officials were interviewed using a community questionnaire to obtain detailed information regarding the village, likely community properties to be affected, and their preference concerning benefits from the proposed project, type of wild animals in the area as well as indigenous trees and areas of environmental importance located in the villages. The main aspects discussed during the community meetings are presented in Appendix 4.

Photo 1: Village Meeting in Singida District

After conducting village meetings, village officials were interviewed using a community questionnaire to obtain detailed information regarding the village, likely community properties to be affected, and their preferences concerning benefits from the proposed project, type of wild animals in the area as well as indigenous trees and areas of environmental importance located in the villages. The location of the villages visited during the community meetings is presented in Appendix 1. The main aspects discussed during the community meetings are presented in Appendix 4.

1.4.2.3 Consultation of Project Affected Persons

Project affected persons (PAPs) include all persons whose land will be crossed by the proposed transmission line, which was located using GPS coordinates provided by the technical consultant. The enumerators walked through the proposed wayleave and, with the help of local leaders/knowledgeable persons, identified the landowners of the land. A face-to-face interview was then conducted with the head of household or another adult member of the household available at the time of the visit to fill the household questionnaire (Appendix 3).

Socioeconomic information was collected about household members, livelihood, income and production, land ownership, livestock, crops, trees, as well as principal and secondary structures. Concerns rose about the wayleave and how the transmission line project could affect the households were also gathered. Results from the household survey are presented in Chapter 5.

A total of 537 people completed the household survey, including 519 people that will be affected by the project and 20 people that are part of a control group. This control group is formed of people that will not be affected by the project but who are living in the same area.

1.4.3 Outcome of the Stakeholder Consultation Process

1.4.3.1 National and Regional Stakeholder Meetings

Most of the stakeholders consulted concur with the proposed development in view that the proposed power interconnection project will improve power supplies, stabilize the quality of the electricity and provide diverse source of power in the region. The two countries involved will benefit in terms of improved industrial development, and reduced power cut problems, particularly on the Tanzanian side, which experiences continuous power rationing country wise.

Some stakeholders are concerned that the proposed power interconnection may negatively affect local biodiversity particularly in wildlife corridors between Arusha National Park and Lake Natron Game controlled area, the Enduimet WMA, Burunge WMA, and other wildlife corridors connecting game reserves, national parks and various forest reserves found in the regions. The proposed development would interfere with the natural habitat and could trigger soil erosions in highlands slopes and cliff particularly when crossing the rift valley at Mto wa Mbu. However, the intensity of damage potentially caused by the proposed development is going to be minor, given the nature of the

project and the span between successive pylons. It is thus important to take active mitigation measures to address the foreseen impacts.

The stakeholders were very receptive and open in their discussions, putting a lot of emphasis on compensation/resettlement issues and on impacts on environment and wildlife. The main aspects discussed during the meetings with national and regional stakeholders are presented in Appendix 4.

1.4.3.2 Community Meetings

It should be noted that most PAPs accept the project as they perceive that it will have positive direct and indirect benefits for the local and national economy. However, a few PAPs (3%) accept the project simply because it is a government-supported project and they believe they have no other option.

The main concerns raised in the community meetings are presented in Table 4.6. All the issues discussed in each community meeting are presented in Appendix 4.

It should be noted that most PAPs accept the project as they perceive that it will have positive direct and indirect benefits for the local and national economy. However, a few PAPs (3%) accept the project simply because it is a government-supported project and they believe they have no other option. The main concerns raised in the community meetings are presented in Table 4.6. All the issues discussed in each community meeting are presented in Appendix 4.

Table 6: Summary of Issues and Concerns discussed during Community Meetings

Issues	Concerns
Local employment	Communities wish that local manpower be hired during construction.
Compensation	Communities with an existing transmission line are concerned that they will not get fair compensation taking examples from similar projects, i.e. Singida - Arusha line and the Singida - Babati road, where the compensation exercise was not well undertaken. PAPs revealed that they need to be guaranteed that this exercise shall be fair and all affected persons involved.
	Concerns were expressed regarding the mode of compensation, especially for cases where the affected properties are structures. They wonder who will manage the funds and supervise the construction. After being provided with information about options of compensation, i.e. cash or in-kind compensation, most of the village leaders preferred in-kind compensation, as it is difficult to manage funds to construct a public property affected to a similar or more improved standard.

Issues	Concerns
	Communities are concerned about deriving/establishing prices for compensation. They worry they will not be fully involved or even if they are involved, their recommendations might not be taken into consideration, especially for land value. Therefore, they recommend that they should be fully involved. Similarly, PAPs are indicating that even indigenous trees should be compensated as they have a significant range of economic, cultural and environmental value.
Community benefits	Affected communities wish to directly benefit from the project by being connected to the National Grid. As experience indicates, some communities have a transmission line passing through their village but they are not connected to the transmission line.
Scarcity of land	Land is scarce in areas that have high agricultural potential as well as in villages close to urban areas. PAPs revealed that it may be difficult for them to obtain land of the same quality in the same area due to land scarcity. Areas where there is very fey available land are Misuna-Singida, Endasaki and Katesh-Hanang, and Kisongo-Arusha, Hanang District, villages of Engutoto, Likamba Langijave and Oldonyo Sambu. In Oldonyo Sambu, for instance, areas that can be used for agriculture are very minimal due to erosion and soil type.
Impact on infrastructure	PAPs, local governments as well as District authorities were concerned with the impacts that the project might have to community properties such as schools and water sources. They revealed that their preference would be for the project to consider alternative route to minimise impacts on such properties as in most cases the location of these properties is in areas that has been convenient to the community.
Land use	Some villagers have mentioned that they wish to continue their agricultural activities (crops or livestock) within the wayleave once the project is implemented.

1.4.3.3 Community Consultations among the Maasai

A significant portion of the transmission line goes through land inhabited by Maasai. Namanga-Arusha, Monduli and parts of Babati district are dominated by Maasai. This group is very unique in Tanzania as they are a remaining tribe that is significantly attached to its culture and live by its cultural norms and procedures. During consultations, special respect was given to groups of Maasaï and their requirements were considered.

Discussion with community development officers in all districts dominated by Maasaï helped us work and consult with them. During these meetings, the community development officers worked hand in hand with the team, introduced the project and guided the discussion. In some occasions, explanations were given in Maasai language.

According to the Maasai tradition, all issues have to obtain blessing from the Maasaï group of elders, commonly known as *Laigwanani*. The

Laigwanani must first communicate to the entire community and then the response to the community becomes possible. Failure to engage the elders at all levels of consultations may lead to community refusal to support the project or reject the project all together. For instance, at Ilkuroti village in Arusha, the team had to visit the village three times to make sure they involved the *Laigwanani*. Women participation may be limited, as they have to seek consent from their husband. However, during the consultation process, a number of women participated and were asking questions in general meetings organised by village leaders and Maasaï elders. More involvement of the women was through women groups where freedom of expression is very important. Some of the women groups consulted include MWEDO in Longido District and AFNET in Babati District.

Photo 2: Maasai Women Attending a Meeting in a Village in Monduli District

1.4.3.4 NGO and CBO Meetings

The main issues raised during the meetings mainly concerned the participation and involvement of the community as well as direct benefits to the local communities (Table 7) below and ESIA report Volume III.

Table 7: Summary of Issues and Concerns discussed during NGO and CBO Meetings

Issues	Concerns
Community participation and involvement	Participation and involvement of the community at all stages of the project development and implementation was important as the community will live with the project in the future. It is important to enhance community participation and involvement of all stakeholders of the project, especially local communities. Similarly, issues concerning compensation have to be open and local communities have to be educated on all consequences of the project, their rights in terms of compensation and how to handle grievances when it comes to filing peoples' complaints.
	Involvement of women, especially during the valuation and compensation processes, is important as in most cases; they are the ones that are mostly affected. For instance, in Monduli and Longido districts, women rarely own land and therefore they are also left out of decision making. Support in improving health facilities and social infrastructures like schools and village offices.
	Involvement of NGOs and CBOs was also raised. They recommend that it is important for project promoters to involve local CBOs in sensitization of local people on issues such as HIV/AIDS, land and gender as well as how to spend their compensation money.
Benefits to the community	The project should ensure direct benefits to local communities, especially to ensure that they benefit from electricity. Most villages to be affected by the project are not connected to the national grid while they do have potential of developing small businesses should they have access to electricity. Therefore it was emphasised that these local communities should be connected to the grid to enable them improve their living standards. On income Generating Activities, community should be facilitated in alternative income project, where towers have brought in invasive prey birds threatening domestic cheken

CHAPTER TWO

2.1 DESCRIPTION, SCOPE AND JUSTIFICATION OF THE PROJECT

The general objective of the project is to increase transit capacities and flexibility of operation of the grid and to improve sustainable electricity supply in Kenya, Tanzania and the East Africa Power Pool (EAPP). Today, the rate of access of electricity is around 23% in Kenya and 14% in Tanzania. The interconnection project will enhance economic and social development in the region by improving quality and increasing energy availability. The project will provide a more sustainable energy supply for both countries and will increase power supplies to areas lacking electricity. The project will then help reduce the duration and frequency of power interruptions in both countries including Nairobi, Isinya, Arusha, Manyara, Dodoma and Singida regions. It will help reducing power system and technical losses to meet the existing and increasing power demand in the whole area.

In incidence of import and export of electricity; the 400KV interconnections will be an economical transporting intermediate from one state to another to enhance the deficient in of electricity, aligned with the surplus available in the other end. The Kenya side will be interconnected from the North together with Ethiopia and South Sudan; while from Tanzania the interconnection with South i.e. Zambia and Zimbabwe will come through Tunduma border and joined in Singida

The Arusha Substation will have hub check interconnection i.e. from the Dar es Salaam 400KV and the Isinya Singida interconnection which will be connected also from the Zambia Tanzania back bone interconnection.

Indeed, it appears that this initiative will develop rural electrification projects that will increase electricity connectivity all over the two countries. Higher electricity availability would in turn spur development of small industries, including tourism, and rural-based industries such as agro processing. The benefits from rural electrification are also very significant for the population by serving global warming, educational and medical infrastructures.

2.2 Line Route and Corridor Alternatives

At the stage of the preliminary study, different corridors were compared i.e. corridor A, B and C from Arusha after reviewing and having previous consensus on the Isinya Namanga Arusha ROW, this targeted to determine a final corridor route with friendly low cost and mitigation able impacts to Singida.

Table 8: Scoping matrix

TOPIC Refer to regulation	Potential Impacts			
	Construction Phase		***Operational Phase***	
	Degree of	***Description***	***Degree of***	***Mitigation***
Community	Neutral to slight negative	General disturbance fro the e Construction e.g. Noise ,Dust	slight to moderate	Improve site in greater amenity
	Slight negative	Disruption to existing carpenters site use for furniture making	neutral	displacement to designated area
Flora-terrestrial and landscape	Neutral to Moderate	Disturbance of habitat during construction activities clearing of trees and grass	Neutral	improve gardening on surrounding
Fauna – aquatic mammals	Neutral to Moderate	Removal of habitat and food source during construction	Neutral Pos.	No required further Assess require
Cultural heritage	Slight negative	removal of unknown archaeological during excavation	unknown	Further assessment required/considered
Avifauna	Neutral to Moderate	temporary disturbance of habitat	Neutral	

	negative	and food chain		
Air quality	slight negative	dust and waste pollution	slight moderate	further assessment required/considered
Climate	Neutral	removal of carbon sink -fumes from machine	Neutral	No impact
Landscape	Neutral to Moderate	Visual impact of construction activities -alteration of landscape and scenic -loss of income due to resettlement {crops, place of abode.	Moderate	Further assessment to adjacent community and road users required/considered selective removal of vegetation rather than clearing
employment	slight neutral to moderate	local employment rather than outsiders on none professional jobs	minor	women should be part of employees; adhere to employments regulation on safety and fringe benefit
soil quality	moderate negative	degradation of soil quality, affecting natural habitat and suitable soils for cultivation -soil erosion	minor	shall adopt work schedule to take into account of rain season ensure re-vegetation and

				selective clearing
surface water and sedimentation	moderate negative	wetland disturbance run off contamination modification of aquatic habitat erosion and sedimentations	moderate	further assessment/consideration of limit vegetation removal prior drainage design

Corridor Alternatives between Arusha and Singida Substations

At the initial stage of the project, three corridors (A-B-C) were compared between Arusha substation and Singida substation connecting to the Namanga ROW. Following this comparison, Corridor B was chosen. The criteria used for the design and the selections of the least impact corridor were:

1. Technical: topography, watercourses, soils, access, poorly drained and floodable sectors, airports, power line and road crossings, number of angles, etc.;
2. Environmental: vegetation, protected areas, main watercourses, birds and mammals migratory corridors, fauna reproduction areas, etc.;
3. Socioeconomic: number of villages affected, tourism infrastructure (lodges, etc.), permanent agriculture (coffee, fruits, etc.), livestock, tree plantations, military grounds, etc.

Table 9: Summary of Alternative Corridors Analysis Matrix

Criteria and issue of concern		**Corridor**		
		A	**B**	**c**
Technical	Topography	Undulated	Flat plain	Hilly rocks
	Distance	334km	301km	388km
	Watercourse Rivers/streams	>109	>47	>54
	Wetland/swamps	high	moderate	moderate
	Accessibility Roads/tracks Existing way leave	Good >128 >85% new alignment	Very Good >135 >68% Follow old 220kv mostly	Poor >73 .>95% new alignment
	Roads crossing	high	high	moderate
	Number of angels	High to avoid dense population	moderate	High (avoid hilly and rock
Environmental	Vegetation or plantations	High (new way leave site)	Moderate clearing	High (new clearing forest and thickets)
	Critical ecological e.g. breeding	Moderate (i*mpede lesser flamingo route L*	Minor nesting affected	moderate

	roosting areas threaten 21species	*Natron to Lake Manyara*		
	Wildlife/birds corridors	corridor and flying route (Manyara NP-Lake Natron/Ngorongoro CA	Cross 4 wildlife corridors and flying routes	Cross2 wildlife controlled areas
social Economy	Settlements	Demolish >700 infrastructures	Demolish <700 infrastructures	<600 infrastructures
	Villages and agriculture density	high	moderate	minor
	Attract/close to investments zone	Makuyuni investment zone &rural electrification	Makuyuni investment zone& REA	Out/
	Affect Tourist infrastructures	moderate	minor	na
	Cross Farms/Estates	high	none	none
	Cross Military site or sensitive areas e.g. airport	2 camps Monduli; Makuyuni	Yes; follow 220kv Airport avoided	None
	impede Cultural and heritage site	None	None ;almost all avoided	Yes (Kinyari site) in segment 8

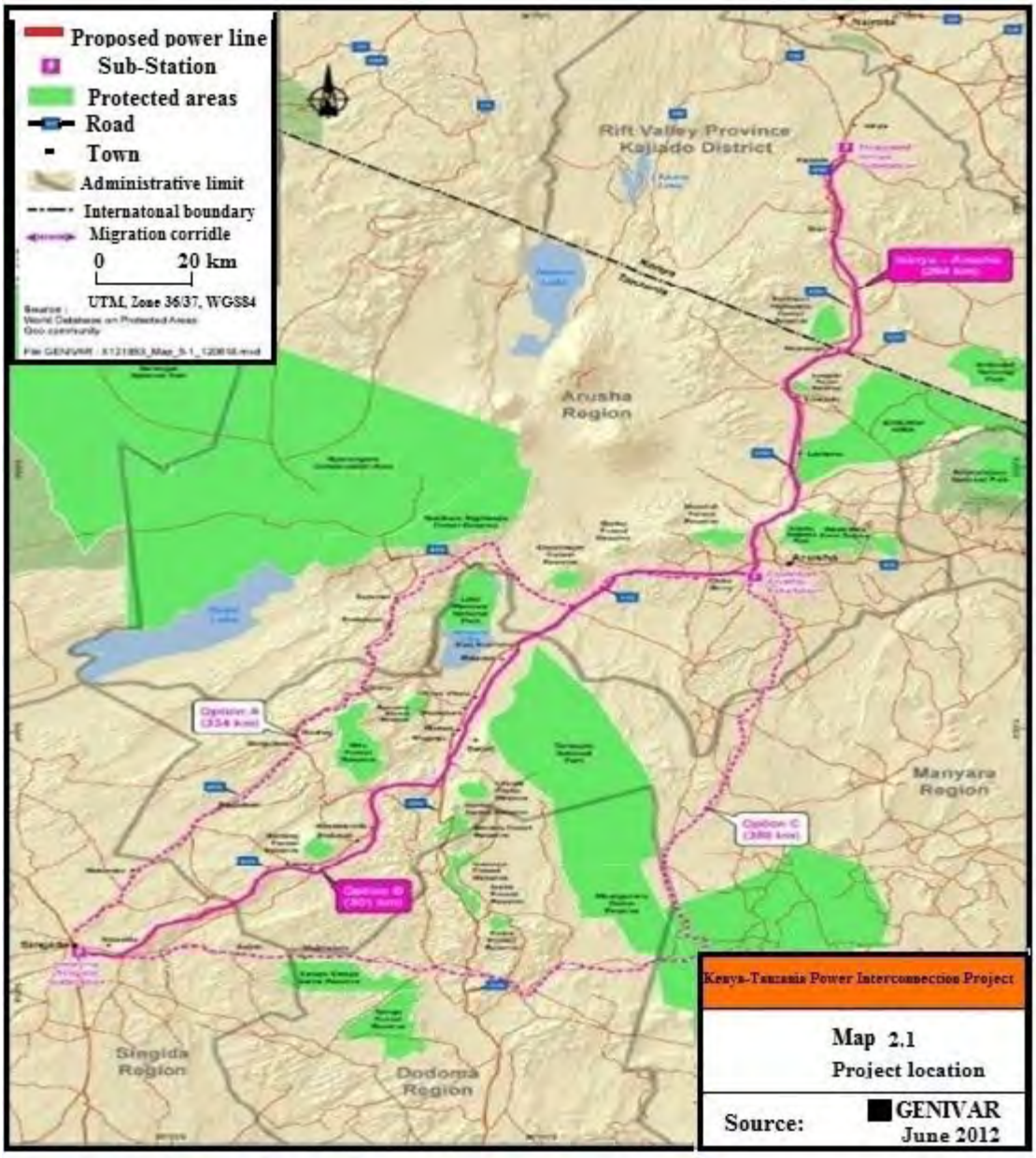
NB*; some of the data above are subjective e.g. Number of rivers and roads and tracks; due to lack of data in the unique description where issues like* ***few*** *streams/rivers or* ***few*** *tracks and roads have been repeatedly used. To balance the data the word* ***few*** *in the above data has been taken as* ***2*** *(two)*

For technical and environmental reasons, Corridor B was preferred due to its direct route from the proposed Arusha substation to Singida substation. Also, for about 207 km of the 301 km between Arusha and Singida, the proposed corridor follows the existing 220 kV transmission line, which reduces environmental and social impacts. Corridor B is also the shortest alternative with the fewest number of angle points and least amount of technical constraints and problematic zones, therefore costs associated with this option should be less.

The following positive aspects were also identified during stakeholders meetings:-

- There are less potential cultural heritage sites in Corridor B than in the other corridors;
- There are less farms and settlements in Corridor B than in Corridor A;
- Even if there are a number of migratory corridors in Corridor B, especially between Tarangire and Manyara Lake National Parks, it will have a minimal impact on this issue compared to Corridors A and C;
- Corridor B is already impacted by the presence of another transmission line, a maintenance road is already present and can be used for both lines, the width of the ROW for this new line is also minimised because it shares its space with the existing 220 kV line;
- Makuyuni, which is located at a little more than 1 km west of Corridor B, is an Export Processing Zone (EPZ) for the region as it is the main junction to Arusha, Babati, tourist circuits, Mwanza and Musoma. Additional power will thus represent an advantage for the development of this area.

The final corridor is about 415 km long (Map 1).



Map 1: Project Location

2.3 Description of the Corridor

2.3.1 Namanga-Arusha Corridor

As per the Terms of Reference, the first corridor considered between Isinya and Arusha was the one proposed by BKS-Acres (2002). Following the site visit in January 2011, the route of this corridor was optimized to consider the environmental and social issues and specially to minimize relocation and compensation needs and impacts on landscape.

2.3.2 Brief description of the corridors, from Isinya Substation to Namanga/Kenya border

The Kenyan section of the corridor has a total length of about 90 km. The corridor crosses the border at Namanga. It should be noted that there are no wildlife corridors crossed by the transmission line in Kenya.

The terrain vegetation consists of a mixture of grasslands, shrubs and scattered trees. The terrain profile is lightly hilly and generally descending. From Kenya terrain vegetation is still a mixture of grasslands and shrubs into Tanzania Boarder south east of Namanga. The terrain profile remains lightly hilly and generally descending.

2.3.3 Description of the Corridor's, from Namanga Border to Singida Substation

The Tanzanian section of the corridor has a total length of about 415 km. The corridor crosses the border at Namanga and ends at Singida substation. To make its description easier, this portion of corridor was divided into 14 sections (Maps 4 to 17, Appendix 1).

2.3.3.1 Section from Tanzanian Border – E17 (Map 4)

This section changes to a southwest direction and continues to follow road A104 for 20,7 km. The beginning of this section passes east of the city of Namanga. Throughout this section, the corridor crosses several streams and tracks. Between angles E11D and E11E, the corridor crosses road A104 from east to west. From angle E11E to angle E17, the corridor passes just to the north of the village of Kimokouwa.

Population is dense around the village of Namanga but light elsewhere in the section and access to the corridor remains good.

The vegetation in the area consists of Acacia wood land, grasslands and shrubs. Terrain profile in the region is hilly throughout most of the section.

2.3.3.2 Section E17 – E21 (Map 5)

From angle E17, the corridor takes to a southern direction for 38.8 km following the route of road A104. From angle E17 to angle E19, the corridor crosses several streams and tracks and also loops around Longido National Forest Reserve, with the corridor located about 2 km to the west of the village of Longido. Angle E18 is located near the Olkaju Lo Murwak River and the corridor follows it until just after E19 where it crosses the river. From angle E19, the corridor cuts a few tracks, the Tanganyet and Nondona Rivers between E20 and E21.

Terrain vegetation in this section consists mainly of Acacia -commiphora shrub lands. From E17, the terrain profile drops to angle E20 and from there the terrain is hilly and ascending. Longido National Forest Reserve and Longido Game controlled areas are protected areas adjacent and within respectively, in this portion of the corridor.

Between angle E20 and E21, near Lariboro, the corridor crosses the Kilimanjaro-Lake Natron wildlife corridor, which connects the two protected areas (see section 5.2.6.1).

2.3.3.3 Section E21 – E31 (Map 6)

This section is 24 km long. From E21 to E27A, the corridor generally keeps to a southern direction and follows A104's route. Then, from E27A to E31, the corridor takes a western trajectory.

The beginning of this section, at angle E21, is located west of Enduimer Wildlife Management Area. Between angles E21 and E22 and just after E22, the corridor cuts several tracks and zones of seasonal swamps. The Lemanda River and a few other streams are then traversed between angles E22 and E23. Mount Kilimanjaro, with its highest peak at an altitude of about 5 900 m, is at a distance of approximately 73 km east from angle E23. Most of the corridor in this section, as well as adjacent sections, is positioned to the west of road A104 so that the landscape of this beautiful region is not disturbed. Between E26 and E27A, the corridor crosses the Lamarida River and road A104. Between E27A and E28, road A104 is crossed a second time. The Lalaiririwar River and several streams are then cut between angles E28 and E29. Continuing its path, the corridor traverses several other streams between angles E29 and E30 that are running off Mount Oldonyo Sambu, located west of the corridor. A few rivers are also crossed by the corridor between E30 to E31.

The region is lightly populated along the corridor path but access is still simple due to road A104 and various discard Namanga Arusha old road tracks. Similar to the previous section, vegetation is mainly shrub lands. The terrain profile is undulating.

2.3.3.4 Section E31 – B8 (Map 7)

This section goes in a southern direction for 30 km that is from E31 to Arusha substation (Photo 2.3). After angle E31, the corridor crosses the Xandasikirlit River and begins to diverge from road A104, not far from

angle E32. The region becomes densely populated in this section and numerous tracks are crossed and located nearby making access to the corridor easy. Angle E44 is located about 2.5 km to the east of the village of Mkulat. This section has many angle points in order to avoid populated areas.

Photo 3: Selected Location for Arusha Substation

The corridor bypasses the Loilenok Hills between angles E41B and E45. An existing transmission line is crossed at angle E45, which can be found at less than 4 km west of the Arusha airport. The population is less dense between E41B and E45 but after E45, the corridor cuts road A104 and the population begins to increase as well as the agriculture. Several tracks are crossed. Angle E47 is located about 1 km to the southeast of the village of Kisongo. The proposed Arusha substation is about 12 km west of Arusha city centre at Lemugur village and is located at a junction with the existing Arusha-Singida 220 kV transmission line. Accessibility to the substation site is through a rough eroded mud track, passing through the black cotton soil for 5km joined to a secondary tarmac road at "A to Z" industrial area

The land is heavily cultivated with some patches of woods, plantations, and grass and shrubs lands.

The terrain profile in this section is hilly but generally descending to reach an elevation of about 1 375 m at the proposed Arusha substation located on the extensive black cotton soil coverage. Road infrastructures to the substation are imminent to be part of the substation package.

Photo 4: Section of eroded road to substation at Lemugur village

From Arusha substation to B8, the corridor follows a western direction for 6 km. The topography of this portion of corridor is relatively flat. This portion of corridor starts by passing between two small hills, in the area of the community Laiwilokwin, and then, goes through the Ardai Plains. Several rivers and streams are crossed throughout this section.

The area is lightly populated and several main tracks and trails are located nearby and are also crossed, therefore access is easy. Between angles B7 and B8, the corridor cuts road A104. Vegetation in the region consists mainly of agricultural lands and grasslands. Maasaï presence is important and the area is crossed by their cattle. A few agricultural fields are crossed as well as inhabited areas.

2.3.3.5 Section B8 – B13A (Map 8)

This section goes west for about 29.9 km. The corridor crosses the Olemusa and Ardai Rivers between angles B8 and B11B. It also crosses the road going North to Monduli, as well as other secondary roads. The corridor also crosses an existing power line near the town of Duka Bovu (Photo 5), between angles B9 and B10. A few other rivers and tracks are crossed between B11B and B13A.

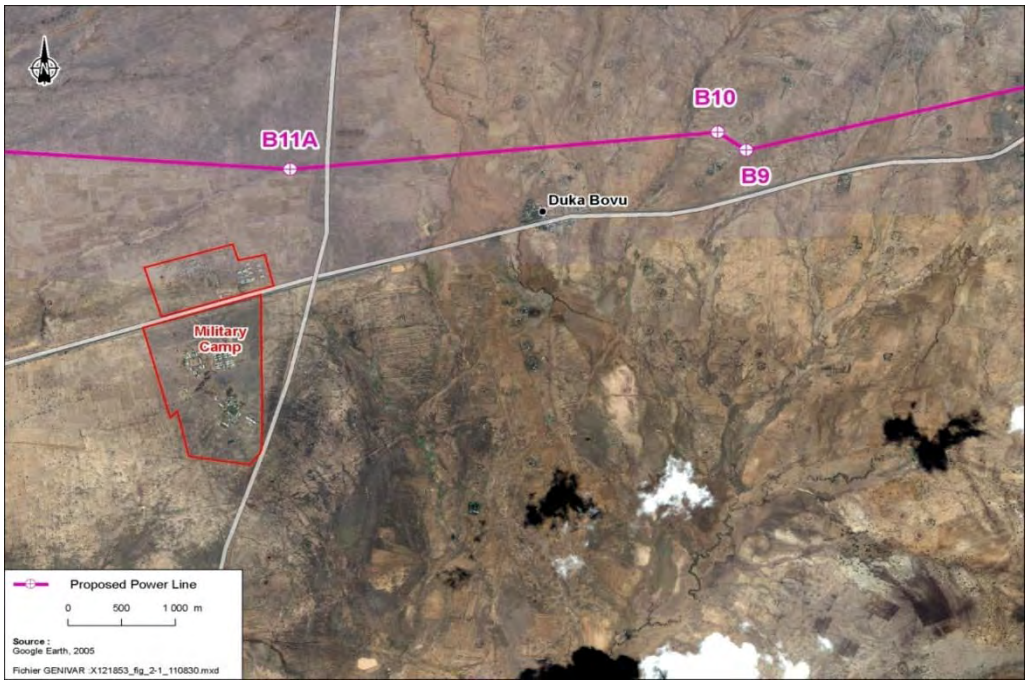
The corridor passes through the military grounds situated between the road A104 and Monduli. This military camp is already crossed by the existing 220 kV line from Arusha to Singida.

- The topography of this section is quite flat as it mainly crosses the Ardai plains. This portion of corridor is also very lightly populated.

- There are no cultural heritage sites in this portion of corridor. The nearest site is a prehistoric pseudo dam, located at about 6 km from the corridor.

- There are no protected areas in this corridor. The nearest being the Monduli Forest Reserve located at about 12 km north of the corridor.

Photo 5: Landscape near Duka Bovu, Monduli District



Map 2: Corridor located north of the Military Camp, Monduli district

2.3.3.6 Section B13A – B16A (Map 9)

This portion of corridor is approximately 28 km long. It is located in a relatively flat sector, although more hilly than the previous portion of corridor. It starts on the southern border of Eluanata-Naja Swamp and generally follows the route of the main road A104, without crossing it. However, the corridor crosses several secondary roads as well as Road

B142, located in Makuyuni. This corridor also crosses an existing power line at a few locations.

After angle B13A, the corridor crosses the Esikiria and Ayaiyai Rivers and a few tracks between angles B13A and B15A. The corridor begins to follow the Kaimisi River from angle B14B and crosses it just before angle B15A. The corridor also cuts a few streams and tracks. At angle B15D, road B142 is crossed by the transmission line. Just before angle B16A, located about 1.5 km to the northwest of the village of Makuyuni, the corridor crosses the Makuyuni and Olikeju Leposhar Rivers. Not far after B16, the corridor passes through a seasonal swamp. Several other streams are crossed.

This portion of proposed corridor does not pass through any villages. Land use is mainly characterized by natural environments and a few agricultural fields. Inhabited areas are avoided, as only a few buildings are present in the corridor. There are no protected areas in the corridor. The corridor passes at more or less 10 km south of the Burko Forest Reserve and Essiminger Forest Reserve. There are no cultural heritage sites in this portion of corridor. The only site located in the vicinity of the corridor is AR 7, Makuyuni. It is located at about 3 km from the corridor.

2.3.3.7 Section B16A – B21D (Map 10)

This portion of corridor has an approximate total length of 31 km. It follows the route of road A104. This road is sometimes included in the corridor and the power line crosses road 104 three times, that is between B16A and B17A, B18A and B18B, B18B and B19A. The beginning of this section is located west of road A104 and it ends east of road A104.

A river is cut between angles B17A and B18A. Just before B19A, the Oltukai River, a few streams and tracks, as well as a seasonal swamp are crossed. The section is lightly populated along A104's route and access to the corridor is easy due to the proximity of road A104 and the various tracks in the region. The corridor also remains parallel to the existing 220 kV line throughout the section. The corridor passes east of Kwa Kuchinja, a few buildings are present in the corridor. The corridor also passes south of Minjingu and includes only a few buildings. Minjingu is the only source of phosphate fertilizer in Tanzania. The phosphate plant is located about 1 km west of the corridor, along the A104 and south of Kwa Kuchinja.

Terrain vegetation consists of a mixture of agricultural lands and plantations but mostly grasslands and shrubs. Agricultural lands are mainly located near the community of Kwa Kuchinja. In this section of corridor, two wildlife corridors are crossed (see section 4.2.6.1). The Manyara Ranch – Lake Natron corridor is crossed in the vicinity of angle B20C. This wildlife corridor starts in the Tarangire National Park, passes through Manyara Ranch and continues northward towards Lake Natron. The other wildlife corridor is the Tarangire – Manyara Corridor, which is crossed between angles B19A and B21C. This wildlife corridor lies between both national parks.

2.3.3.8 Section B21D – B23B (Map 11)

The total length of this portion of corridor is 29.9 km. It is located in a flat area. There are no villages crossed by the corridor. In fact, it passes south of Vilima Vitatu and Madukani.

The corridor cuts very few tracks. Access is however easy since the corridor follows the route of road A104. It is located at about 1 to 3 km east of A104.

There are no protected areas in the proposed corridor. The corridor passes south of Lake Manyara National Park – located to the north-west – and Tarangire National Park located to the south-east –. It also passes west of Lake Burungi, which is in the process of becoming a Wildlife Management Area.

2.3.3.9 Section B23B – B27E (Map 12)

This section is approximately 31.5 km-long. It starts at angle B23B, at about 2 km east of Madwa. It passes at less than 3 km west of Babati at angle B25D, to end a few kilometres further south-west at angle B27E. The corridor follows the route of road A104 until the village of Babati. The corridor crosses road A104 at angle B23F. Near this angle, a few streams are crossed, including the Ingri and Sanga Rivers. Several other streams and tracks are also crossed between B24A and B27D. At angle B27A, the corridor follows the route of road B143. This road is crossed by the proposed transmission line at angle B27C.

The corridor generally stays parallel to the existing 220 kV line with the two lines sharing the same ROW, except for a few location where they shifts way in order to avoid dwellings. The region is lightly populated and access is good due to the location of roads A104 and B143. There are no protected areas and no cultural heritage sites in this portion of corridor. The land use in this portion of corridor is mainly composed of agricultural fields (Photo 6) – towards the end of the section – and natural environments. The vegetation is characterized by the presence of more forest patches than in the previous corridors.

Photo 6: Agriculture between B24 and B25

At Batati, there is a substation were the existing 220 kV Arusha-Singida line is connected. From the substation, a power line crosses to Magugu, Mbulu and Karatu and another one connects Babati substation to Kondoa and Kibaya.

2.3.3.10 Section B27E – B34B (Map 13)

This portion of corridor has a total length of 33.5 km. It follows a western trajectory until Ndareda, around angle B30A, and then goes south until the end of this section, at angle B34B, east of Endasak.

The corridor generally stays parallel to the existing 220 kV line with the two lines sharing the same ROW, except for a few locations where they shift away in order to avoid dwellings. The region is lightly populated and access is good due to the location of road B143. The corridor follows the route of road B143. It crosses the road between B27F and B27G, between B27J and B30A, between B30B and B31, as well as between B32C and B33A.

Several streams and tracks are crossed throughout this section of corridor. In the portion between angles B27E and B27H, the corridor crosses two forested areas. Dareda swamp is crossed near angle B27J, in the vicinity of the village of Ndareda. Another swamp is also crossed at the end of this section, between angles B33A and B34B.

Land use in this section is mainly agricultural with small settlements and villages disseminated along the main road. There are very few natural environments (Photo 2.6). Although this portion of corridor passes through some inhabited areas, it avoids the most densely populated areas, such as Ndareda, Masekaroda and Endasak. There are no protected areas or cultural sites in this corridor. Only one site, DD10 – Kandaga, has been identified at a little less than 10 km to the east of the corridor.

Photo 7: Landscape between B27F and B27G

2.3.3.11 Section B34B – B40E (Map 14)

This section goes south-west for 23 km. It starts east of Endasak at angle B34B and ends south-east of Katesh, at angle B40E. The corridor generally stays parallel to the existing 220 kV line with the two lines sharing the same ROW, except for a few locations where they shifts way in order to avoid dwellings. The region is lightly populated as it avoids the villages of Endasak and Katesh. Access is however easy mainly because of the presence of road B143. In fact, this section of corridor generally follows the route of this road.

Throughout this section, a few streams and tracks are cut. The portion between B40A and B40E is located in a marshy area and passes between a few lakes. As for the previous section, land use is mainly agricultural with small settlements and villages disseminated along the main road.

2.3.3.12 Section B40E – B50B (Map 15)

This section of corridor is 36.9 km long. The topography of this portion of corridor is rugged in certain areas. The proposed corridor avoids

however the most elevated areas. It generally follows road B143 and crosses it one time, at angle B45A. It also crosses several tracks and trails, thus access is simple. Some few small lakes and rivers are crossed by this section of corridor, namely the Endamudik River between angles B47B and B49A.

Land use is mainly composed of agricultural lands and more or less densely forested areas. The portion of corridor from angle B45A to B50B is located west of an important forested area. There are no protected areas and no heritage cultural sites in this portion of corridor. As for the previous section, it is lightly populated. In fact, the end of this section ends at about 6 km south of Endesh. The corridor in this section might be adjusted to use the same ROW as the existing 220 kV line. This will be done in the feasibility stage, as the existing line will be surveyed and positioned using geographic information system (GIS).

2.3.3.13 Section B50B – B58B (Map 16)

This section of corridor is about 23 km long. It generally follows road B143 and crosses this road four times, *i.e.* between B50B and B51A, between B51B and B52A, between B53A and B53B, between B53B and B55. It also crosses numerous tracks and trails. This corridor passes at about 6 km south of Endesh and about 5 km north of Ngimu. The topography of this portion of corridor is relatively rugged and rocky outcrops are found in the corridor.

As for the last part of the previous portion of corridor, the beginning of this portion of corridor (from B50B to B55) follows an important forested area, located to the south. Although there are a few undeveloped areas within the corridor, there are very few forested areas in the corridor. Land use is mainly composed of agricultural fields. There are few buildings present in the corridor, mainly in the vicinity of road B143 (Photo 8).

Photo 8: Existing 220 kV and Dwellings between B53B and B55

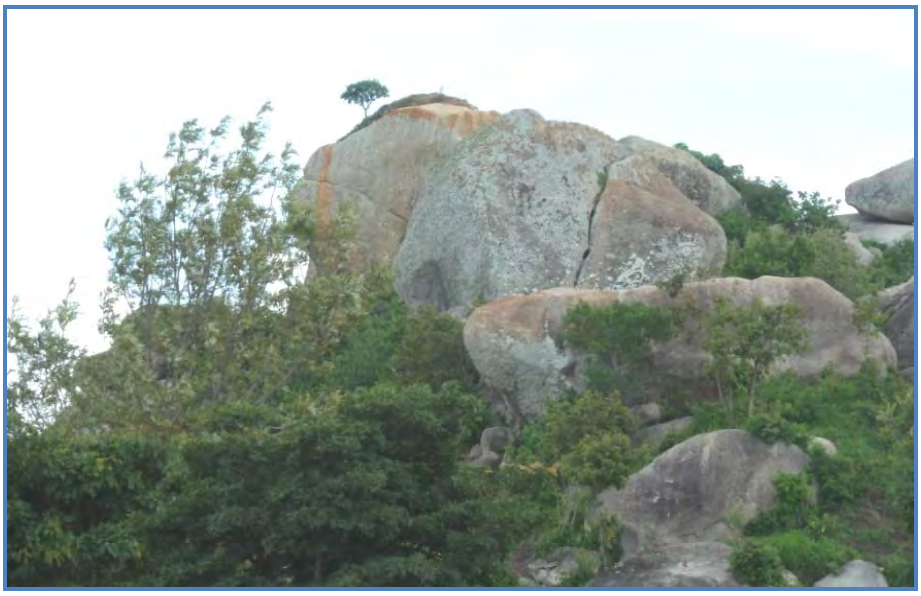
There are no protected areas or cultural heritage sites in this portion of corridor.

The corridor in this section, as well as in the previous sections, might be adjusted to use the same ROW as the existing 220 kV line. This will be done in the feasibility stage, as the existing line will be surveyed and positioned using GIS.

2.3.3.14 Section B58B – Singida Substation (Map 17)

This last section of corridor has a total length of 27.6 km. It follows the route of road B143 and crosses it at angle B61A. At this point, the corridor is located south of B143. This section goes south-west from angle B60A to B61A and then takes a western direction until Singida substation. A number of tracks and trails are present in the corridor, thus access is easy. This section of corridor parallels the existing 220 kV line ROW. In general, the topography is elevated between B58B and B61A, and then the corridor is in the plain until the substation. Near B60A, especially in the southwest, there is a formation of boulder rocks (Photo 9).

Photo 9: Boulders between B60A and B61A



Before arriving at the existing Singida substation, located approximately 2.5 km to the south of the village centre, the Magipandwa River is traversed not far after angle B65A.

The region is lightly populated in the beginning of the section but becomes denser as the corridor approaches the village of Singida municipality. The terrain is a mix of agricultural land and savannah. The existing Singida substation is located at the south end of the city. Now the substation is surrounded by the development of the town and will be very soon totally encircled by buildings (Photo 10).

Photo 10: Singida substation surrounded by Buildings

There are no protected areas or cultural heritage sites in this portion of corridor. The corridor in this section, as well as in the previous sections, might be adjusted to use the same ROW as the existing 220 kV line. This will be done in the feasibility stage, as the existing line will be surveyed and positioned using GIS.

1.4 Project Components

2.4.1 Voltage Level

The transmission capacity of Kenya, as of June 2008, consisted of 220 kV and 132 kV lines, and the distribution system comprised 66 kV, 40 kV, 33 kV and 11 kV lines. In Tanzania, the main backbone power transmission system comprises 220 kV, 132 kV and 66 kV transmission power lines and the distribution system comprises of 33Kv 11kv lines. Considering the projected power transfers between Kenya and Tanzania, and the existing network layout and voltage levels, 400 kV proves to be the optimal voltage solution for this interconnection. This enables a maximum transfer of 1 250 MW.

2.4.2 Number of Circuits

A double-circuit line gives increased transmission capacity and better reliability compared to a single-circuit line but requires about a 45% higher investment. Furthermore, a double-circuit line is more flexible in planning maintenance procedures in the line itself and with the substations as well.

2.4.3 Phase Conductors

All Aluminium Alloy Conductor (AAAC) has been used in Africa in countries where ice loads are not expected and where there is no firm commitment to any particular conductor type. Its usage is justified because of its strength, necessary for very long spans and very heavy loadings.

2.4.4 Ground Wires

According to the electrical requirements, like earth fault currents, one steel wire with a cross section of 70 mm^2 should be sufficient. This wire type is also used as earth wire in both countries.

The high reliability requirements of the line shall be considered when designing the protection against lightning. The average height of highest phase conductor from ground is about 50 m. When using two ground wires instead of one, the weight of the tower decreases, and total line costs including earth wires will be a cheaper solution than a higher tower with one ground wire. Therefore, a two ground wire solution is recommended. In this case, one ground wire is assumed to be optical ground wire (OPGW) and the other conventional galvanized steel ground wire (GSW).

2.4.5 Tower Types

The line route of the interconnection line is mostly flat or slightly hilly, only short sections are slightly mountainous. The self-supported steel lattice towers with steel grillage foundations or concrete foundations are used in Kenya and Tanzania. Both of these foundations types are possible for the interconnection line.

For cost estimation purposes, a normal suspension tower has been designed. The number of heavier towers has been estimated (angle and terminal towers) and taken into account in transmission line cost estimates. A concise geotechnical survey is planned to be conducted as part of the technical team's mandate in the next phase of their study. At this stage of the project, no precise tower designs have been proposed for wetlands. Following the geotechnical survey, appropriate tower design will be considered during the technical team's next phase.

Photo 11: Example of a 400 kV Transmission Line

2.4.6 Foundations

Both steel grillage and concrete foundations are commonly used for high voltage overhead transmission lines in Kenya and Tanzania. Concrete foundations in some locations would be more expensive, mainly due to very high transport costs. Materials such as cement, rebar steel, crushed stones and to some extent proper sand would have to be brought by manpower in some tower locations. Generally, steel grillage foundations are basically acceptable technical solution, as long as there is no damage to the galvanizing and all steel to be buried is painted with two layers of bituminous paint for extra protection.

In the event of unfavourable soil acidity, a piece of iron left outside where it is exposed to moisture will rust. It will do so more quickly in the presence of moisture and salt water the collision rate is enhanced by electrochemical process in which water droplets become voltaic cell in

contact with metal thus oxidizing the iron. Between Kwakuchinja near the salt Lake Manyara and Magugu village near Babati soils of some parts have ***ph*** beyond 8 relatively some places equivalent to sea water salt (District environmental Officer Report 2013; Babati)

Steel and iron products will widely be used in the construction of the 400kv tower, prevention or slowing of rust in this project is of major economic activities through a number of specialized technologies. Rust is permeable to air and water thus the interior metallic iron beneath a rust layer continues to corrode, in this case use of none corrosive metals for the tower or rust coating that preclude rust formation is imminent to prevent tower weakening and fall. Can be attained by using rust resistant alloys; galvanized like application of magnesium; coating and painting; bluing for small scale etc in the named area is highly recommended.

As a conclusion, the foundations are mostly concrete foundations for the suspension towers but steel grillage type shall be used in special conditions, too. The foundations of tensions and terminal towers shall be of concrete.

As previously mentioned, a concise geotechnical survey is planned to be conducted as part of the mandate of the technical team in the next phase of their study. As a preliminary design two main types of foundation are anticipated to accommodate expected soil conditions: slab foundation with reinforced concrete body and rock-anchored concrete block. The first type of foundation is adequate for firm or rigid clay soils, firm or rigid laterite soils, medium to large grained alluvial formations lying above the water table, and dig gable bedrock. The second one is used when bedrock too hard to be excavated by a mechanical shovel is found. Rock-anchored concrete blocks are then required to support the towers.

2.4.7 Clearing of Right-Of-Way

To observe the standards used by TANESCO, the ROW width is proposed to be set to a maximum of 70 m. When sensitive environmental components are present (forests, plantations, etc.), the ROW width to be completely deforested may be reduced by 5 or 10 m. Nevertheless, vegetation without the potential to grow beyond 5 m at maturity will be tolerated; including possible danger trees outside the ROW i.e. big tree/tall trees like the baobabs and *Acacia polycantha*. Although this approach with respect to maintenance aspects could be found hard to accept, experience from other projects in the region has shown that by engaging the local communities along the line in maintenance and monitoring of the line, these ROW requirements could be achieved. This approach is also generally effective to reduce theft of steel bracing and

grounding materials from towers to a minimum[1]. Again, utilization of the terrain when selecting the final line route and spotting the towers are factors which, if skilfully performed, could further reduce the clearance requirements. With an estimated ruling span for the 400 kV line of approximately 350m, the tower heights (from top of foundation to the cross arm) would range from 48 to 50m.

2.4.8 Environmental Considerations

Environmental considerations were integrated in the design of the transmission line and taken into account in the technical feasibility study (RSWI, 2012). As detailed in the technical feasibility study (RSWI, 2012), the transmission line is designed to comply with international standards regarding audible noise, electric and magnetic fields, corona, as well as interference with radio and television signal. The technical feasibility study (RSWI, 2012) also discusses different alternatives related to tower design, span and foundations to minimize cost, ensure mechanical capacity of the towers, wire and other equipments.

2.5 Construction and Operation Requirements

For technical reasons related to the network construction and operation, the line requires a ROW varying from 60-70 m in Tanzania. It is in the middle of this ROW, from where all structures will have to be removed, that the line will be built. In Tanzania, the 220 kV line has a ROW that is 60 m wide. As mentioned above, according to the criteria that are in use by TANESCO, the ROW width which is required to build a new 400 kV line is 90 m wide in Tanzania. In the section of the new 400 kV line built from Namanga and thereafter in parallel to the existing 220 kV line between Arusha and Singida, the additional requisite wayleave width would be reduced to 70 m. In fact, the juxtaposition of the two ROWs will permit that the total width of the two ROWs be reduced to 130 m (60 m for the existing 220 kV line and 70m for the new 400 kV line) instead of 150 m (60 m for the existing 220 kV line and 90m for the new 400 kV line).

TANESCO, which are responsible for maintenance, are well advised to be in good terms with the ROW owners and users so as to provide them with responsibility for vegetation control in their ROW section. This kind of agreement allows the user to go on carrying out his/her income generating activities (*e.g.* agriculture, livestock farming, plantations, beekeeping, etc.) as far as they are not dangerous to the network

[1] Indeed, theft of steel bracing is a difficult phenomenon to counter. TANESCO has tried to hire local community surveillance with mix-results. Public sensitization campaigns are essential to maintain for the success of this measure. Also, these campaigns should emphasize on communities' and country's cost (power and economic activities lost, etc) of these illegal actions. Some technical means could also be explored, such as anti-theft nut or anti-climbing wires, in the most exposed areas.

operation since, for the operating manager, they favour joint ownership thus, the reduction of theft and vandalism risks on the line.

Photo 12: Traditional beekeeping for transformation in the ROW

During construction, it would be necessary to establish temporary construction camps and access roads where required. The location and extent of these components are not known at the moment.

2.6 Project Cost and Schedule

The total project cost calculated in June 2012 value and allowing for 5% physical contingency and using an average inflation of 5% per year is estimated at 240.3 M USD (49.3 M USD for Kenya and 191 M USD for Tanzania).

It does include a cost of 19.8 M USD (7.3 M USD for Kenya and 12.5 M USD for Tanzania) for the mitigation program for environmental and socio-economic impacts of the project, covering compensation for the loss of permanent and temporary assets and livelihood restoration (7 M USD for Kenya and 11.6 M USD for Tanzania) and an Environmental and Social Management Plan (353 850 USD in Kenya and tentatively in November 2013 was 1.951M USD above 1M USD to the ESMP of June, 2012 in Tanzania). Construction will extend to two years.

CHAPTER THREE

3.0 INSTITUTIONAL AND LEGAL FRAMEWORK

This chapter presents an overview of the institutional and legal framework of Tanzania. It should however be noted that before starting any activities during the construction, operational and maintenance, as well as decommissioning phases, the Contractor will have to obtain all the permits and authorizations required for the work to be conducted, specifically near sensitive areas inclusive Military camps and National parks (prior permits need to be in place before commencing work) also in regarding to waste disposal, discharge into the aquatic environment, etc.

3.1 Institutional Framework

3.1.1 Institutional Actors in Environment

The Environmental Management Act Cap 191 provides an institutional set-up for environmental management with details of responsibilities at national, regional, district, and village levels (including a street, which is the lowest administrative level). The institutional set up involves the following main decision making points:

- National Environment Advisory Committee;
- Minister Responsible for Environment in the Vice President's Office;
- Director of Environment (DOE);
- National Environment Management Council (NEMC);
- Sector Ministries;
- Regional Secretariats; and
- Local Government Authorities (City, Municipal, District, and Town Councils; Township; Hamlet (*Kitongoji*); Ward; Street (*Mtaa*); and Village).

The Vice President's Office (VPO) is the main regulatory organ and responsible for coordinating environmental management in Tanzania. Within the VPO, Division of Environment and National Environmental Management Council are responsible for policy development and enforcement respectively. Similarly, other sector ministries and agencies are equally involved in implementing environmental policy objectives. The Environmental Management Act Cap 191 outlines in detail environmental management processes in Tanzania.

National Environmental Advisory Committee

The National Environmental Advisory Committee is formed following directives of the Environmental Management Act (Cap 191). The Committee is responsible for among others:

- Examining any matter which may be referred to by the Minister related to the protection and management of the environment and

recommend to the Minister of sector actions necessary to be taken to achieve the objective of the Act;

- Advising the Minister on any matter in connection with restocking and limitation of stock;
- Making recommendations to the Minister where there is degradation of the environment.

The Minister of Environment

The Minister of Environment is the custodian and the main actor with respect to all environmental matters according to the provisions of the Environmental Management Act. The Minister oversees the implementation of the Act and reports to the Cabinet and the parliament on the state of environment and sets out rules, regulations and guidelines for the implementation of the Act.

Director of Environment (VPO)

According to the Act (Cap 191), the Director of Environment in the VPO is responsible for policy development and advising the Minister for Environment on environmental issues that have policy implications. The Director is responsible for:

- Coordinating various environmental management activities being undertaken by other agencies and promoting the integration of environment consideration into development policies, plans, programmes, strategies, projects and undertakes strategic environmental assessment in order to promote sustainable development;
- Advising the Government on legislative and other measures for the management of the environment or the implementation of the relevant international agreements with respect to the environment;
- Monitoring and assessing activities, being carried out by relevant agencies in order to ensure that the environment is not degraded by such activities;
- Preparing and issuing a report on the state of the environment in Tanzania;
- Coordinating issues relating to articulating and implementation of the National Environmental Policy.

National Environment Management Council (NEMC)

NEMC was formed by the Act of Parliament No. 19 of 1983 to perform an advisory role to the government on matters related to the environment. This role was changed and the 1983 Act was repealed by the Environmental Management Act Cap 191 (Act 20 of 2004), which drastically and radically changed the role of NEMC.

According to the Act (No. 20 of 2004), the Council shall undertake the following activities:-

i. Enforcement, compliance, review and monitoring of environmental impact assessment, and in that regard, NEMC is also required to facilitate public participation in environmental decision making, exercise supervision and coordination over all matters related to the environment;

ii. Prepare and submit to the Minister a bi-annual report concerning how it has implemented the provisions of the act;

iii. Carry out environmental audits;

iv. Carry out surveys which will assist in the proper management and conservation of the environment;

v. Undertake and coordinate research, investigation and surveys in the field of environment;

vi. Review and recommend for approval environmental impact statements;

vii. Enforce and ensure compliance by the national environmental quality standards;

viii. Undertake in collaboration with relevant sector environmental education programmes;

ix. Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.

NEMC is led by a Director General and governed by a Board of Directors, whose Chairman is appointed by the President.

Sector Ministries

The Act directs that each Ministry must have Sector Environmental Section which shall have the following functions:

- Ensure compliance by the sector Ministry with the requirement of the Environmental Management Act;
- Ensure all environmental matters, in other written laws falling under sector ministry, are implemented and report of their implementation is submitted to the Director of Environment;
- Liaise with Director of Environment and the Council on matters related to the environment.

Each sector environmental section is required to:-

i. Advise on and in collaboration with other bodies, implement the policies on environmental management;

ii. Coordinate activities related to the environment within the Ministry;

iii. Ensure environmental concerns are integrated into the Ministry or departmental development plans and are implemented to protect the environment;

iv. Promote public awareness on environmental issues;

v. Refer to the Council any matter related to the enforcement for the purpose of this Act;

vi. Oversee the preparation and implementation of EIA required for investment in the sector;

vii. Ensure compliance with various regulations, guidelines and procedures;

viii. In collaboration with the Ministry responsible for local government, provide environmental advice and technical support to district level staff working in the sector;

ix. Prepare and submit to Director of Environment bi-annual report concerning the state of the segment of the environment and the measures taken by that sector to maintain or improve the environment;

x. Review environmental laws falling under the sector.

Each Sector environmental section is led by the Sector Environmental Coordinator who will be responsible for coordinating sector based environmental issues and reporting to the Director. Other institutions as per the Act include regional secretariat, local government authorities that have responsibilities to manage the environment at local level. The proposed development will touch several institutions and organizations.

3.1.2 Energy Sector

The mission of the Ministry of Energy and Minerals in the energy sector is to provide an input into the development process of the country through establishment of a reliable and efficient energy production, procurement, transportation, distribution and end use system in an environmentally sound manner (The Tanzania National Website, 2010).

Tanzania's power sector is dominated by a single vertically integrated national utility; Tanzania Electricity Supply Company Ltd (TANESCO), a parastatal organisation established in 1964 and is wholly owned by the Government of Tanzania. The Ministry of Energy and Minerals regulates the operations of TANESCO. The Company's core business is generation, transmission, distribution and sale of electricity to the Tanzania mainland and bulk power supply to the island of Zanzibar.

However, the new Energy Policy of Tanzania allows IPPs to generate electricity from different sources including new and renewable sources of energy, particularly for the rural population of Tanzania.

3.2 Institutional Actors as regard to Population Resettlement and Compensation

The institutional actor for population resettlement and compensation is the Ministry of Lands, Housing and Human Settlements Development. This Ministry is mainly responsible for land use planning, surveying and demarcating land/parcel/farms, and provision of land ownership and tenancy in both rural and urban areas. Within the Ministry, there is a Chief Government Valuer who is responsible among other things to ensure that prior to compensation of assets to any Project Affected

Persons (PAPs); valuation reports are prepared according to the Land Act of 1999. Therefore, after a valuer has prepared a valuation report, the report is sent to the Chief valuer for approval.

3.3 Legal and Regulatory Framework

3.3.1 The Tanzania Development Vision 2025

The Tanzania Vision 2025 was developed in the mid-1980s. It was developed when the government realized that past development policies and strategies were not adequately responding to changing market and technological conditions in the regional and world economy and were also not adapting to changes in the domestic socio-economic conditions.

Consistent with this vision, Tanzania of 2025 should be a nation imbued with five main attributes:-

- High quality livelihood;
- Peace, stability and unity;
- Good governance;
- A well-educated and learning society; and
- A competitive economy capable of producing sustainable growth and shared benefits.

High Quality Livelihood

By the year 2025, racial and gender imbalances will have been redressed such that economic activities will not be identifiable by gender or race. All social relations and processes, which manifest and breed inequality in all aspects of the society (i.e., law, politics, employment, education, culture), will have been reformed.

Peace, Stability and Unity

Although Tanzania has enjoyed national unity, peace and stability for a long time, these attributes must continue to be cultivated, nurtured and sustained as important pillars for the realization of the Vision.

Good Governance

By 2025, good governance should have permeated the national socio-economic structure thereby ensuring a culture of accountability, rewarding good performance and effectively curbing corruption and other vices in society.

A Well Educated and Learning Society

Tanzania envisages being a nation whose people are ingrained with a developmental mindset and competitive spirit. These attributes are driven by education and knowledge and are critical in enabling the nation to effectively utilize knowledge in mobilizing domestic resources for assuring the provision of people's basic needs and for attaining

competitiveness in the regional and global economy. Tanzania would brace itself to attain creativity, innovativeness and a high level of quality education in order to respond to development challenges and effectively compete regionally and internationally, cognisant of the reality that competitive leadership in the 21st century will hinge on the level and quality of education and knowledge.

A Strong and Competitive Economy

Tanzania should have created a strong, diversified, resilient and competitive economy which can effectively cope with the challenges of development and which can also easily and confidently adapt to the changing market and technological conditions in the regional and global economy.

Most of the development initiatives implemented now, including the proposed power transmission project are aimed at contributing to the realization of Vision 2025.

3.3.2 National Policies

National Environment Policy, 1997

The National Environment Policy (NEP) is the main policy document governing environmental management in Tanzania. The policy addresses environmental issues as both natural and social concerns, and adopts the key principle of sustainable development. The policy has also proposed a framework for environmental legislation, to take account of the numerous agencies of the Government involved in regulating the various sectors. Thus, the policy provides strategic plans on environmental management at all levels. It provides the approach for mainstreaming environmental issues for decision-making and defining sectoral policy action plans.

The overall objectives of the NEP are, therefore, the following:

i. To ensure the sustainability, security and equitable use of resources in meeting the basic needs of present and future generations without degrading the environment or risking health and safety;

ii. To prevent and control the degradation of land, water, vegetation, and air, which constitute our life support systems;

iii. To conserve and enhance our natural and man-made heritage, including the biological diversity of Tanzania's unique ecosystems;

iv. To improve the condition and productivity of degraded areas, as well as rural and urban settlements, in order that all Tanzanians may live in safe, healthy, productive and aesthetically pleasing surroundings;

v. To raise public awareness and understanding of the essential links between the environment and development, and to promote individual and community participation in environmental action;

vi. To promote international cooperation on the environment agenda, and expand participation and contribution to relevant bilateral, sub-regional, regional, and global organizations and programs, including the implementation of treaties.

The policy requires EIA to be mandatory for all development projects likely to have significant environmental impacts. The intention is to ensure that projects are implemented in an economically sustainable manner while safeguarding environmental and social issues for the benefit of the present and future generations.

National Land Policy, 1995 (revised in 1997)

The main objective of the National Land Policy (URT, 1997) is to address the various and ever-changing land use needs. The Policy aims "to promote and ensure a secure land tenure system, to encourage the optimal use of land resources and to facilitate broad-based social and economic development without endangering the ecological balance of the environment" (ibid: 5). Specific objectives are outlined in the Land Policy. However, the following are directly related to the proposed transmission project:

- Ensure that existing rights in land, especially customary rights of small holders (i.e. peasants and herdsmen who are the majority of the population in the country), are recognized, clarified, and secured in law;
- Set limits on land ownership which will later be translated into statutory limits to prevent or avoid the phenomenon of land concentration (i.e. land being held by few individuals);
- Ensure that land is put to its most productive use to promote rapid social and economic development of the country;
- Protect land resources from degradation for sustainable development.

National Forest Policy, 1998

The overall goal of the National Forest Policy (URT, 1998) is to enhance the contribution of the forest sector to sustainable development of Tanzania and the conservation and management of the natural resources. The main objectives of the Forest Policy include "sustainable supply of forest products and services by maintaining sufficient forest area under effective management; increased employment and foreign exchange earnings; ecosystem sustainability through forest conservation and enhanced national capacity to manage forest sector" (URT, 1998:14).

The Forest Policy recognizes that investment or development in forest areas may cause adverse environmental impacts. The policy recommends environmental assessment as mandatory requirement in order to ensure damage to the environment is avoided and possible mitigation measures are provided.

Wildlife and Wetland Policy of Tanzania, 2007

The Wildlife and Wetland Policy of Tanzania promotes the conservation of wildlife as natural resources of great biological, economical, and nutritional values (URT, 2007). It also promotes a clean environmental, climate amelioration, and water and soil conservation. The long-term goal of the policy is to maintain great biological diversity, which contributes to a healthy environment and to the national economy. The policy recognizes the implication of human and development activities on wildlife resources inside and outside protected areas, and calls for environmental assessments for proposed development in order to minimize negative impacts.

Energy Policy of Tanzania, 1992 (revised in 2003)

The main objective of the Energy Policy of Tanzania (URT, 2003) is to improve the welfare and living standards of Tanzanians. The Policy aims to provide input in the development process of the country by establishing a reliable and efficient energy production, procurement, transportation, distribution and end-use system in an environmentally sound manner and with due regard to gender issues. The strategic focus of the Policy in meeting the main objective is to undertake the following activities:

- Develop domestic energy resources, which are least cost options;
- Promote economic energy pricing;
- Improve energy reliability, secure and enhance energy efficiency;
- Encourage commercialization and private sector participation;
- Reduce forest depletion;
- Develop human capacity.

Even with the Energy Policy in place since 2003, Tanzania is still facing major problems regarding energy. Only about 10% of the 35 million people in Tanzania are connected to the national grid, and in rural areas, this is about 1% of the population. Over 90% of the energy consumed is from fuel wood and charcoal, thus putting more pressure on forest resources. Power cuts in urban areas are also frequent even when there has been sufficient rain to fill the dams because of old and unmaintained infrastructures. Power transmission lines and inadequate capacities are associated with these problems. The proposed construction of the power transmission line is intended to alleviate the problem of inadequate power supply particularly to the north-western region.

National Water Policy, 2002 (revised in 2009)

The objective of the National Water Policy is to develop a comprehensive framework for optimal sustainable and equitable management of the national water resources for the benefit of all Tanzanian based on clean set guideline principles. In this case, the policy recognizes the need to protect water sources against pollution and environmental degradation.

National Human Settlements Development Policy, 2000

The overall objective of the National Human Settlements Development Policy (NHSDP) is to promote the development of sustainable human settlement and to facilitate the provision of adequate and affordable shelter to all people, including the poor. The policy outlines a number of objectives including environmental protection within human settlements and protection of natural ecosystems against pollution, degradation and destruction.

The NHSDP recognizes planning and management of human settlement areas as one of the broad human settlement issues. Within this regard, the NHSDP identifies environmental protection as one of the strategic issues in human settlement planning and development. NHSDP also addresses the following issues:-

- Lack of solid and liquid waste management, leading to environmental deterioration;
- Emission of noxious gases from vehicles and industrial activities as a major cause of air pollution in urban areas;
- Encroachment into fragile and hazardous lands (river valleys, steep slopes and wetlands) leading to land degradation, pollution of water sources, etc.;
- Increasing dependence on firewood and charcoal as a main source of energy in human settlements leading to depletion of forest, environmental deterioration and air pollution; and
- Unauthorized sand mining in river valleys leading to environmental degradation.

Agriculture and Livestock Policy, 1997

The Agriculture and Livestock Policy of 1997 addresses changes that affect the agricultural sector in Tanzania, specifically restrictions to agricultural practices stemming from the national Land Use Policy of 1995. The Agriculture and Livestock Policy also addresses the needs of women in agriculture and the needs for agricultural practices to evolve in order to ensure protection of the environment. The policy promotes good husbandry and increased agriculture production.

According to this policy, the land under the power transmission lines becomes wholly owned and managed by TANESCO and is exclusively for energy uses. Neither farming nor settlement is permitted on such land. However, cultivation of seasonal crops below the power line is common at owners risk and TANESCO has not taken a firm stand against such practice.

Antiquities Policy of 2008

Antiquities Policy of 2008 defines Physical Cultural Resources (PCRs) as any tangible material that represent contemporary, historic, and pre-historic human life ways. Antiquities Policy (2008) section 2.1 points out that already discovered PCRs shall be preserved and conserved in the National Museum of Tanzania as stipulated in Museum Act of 1980. In

addition, the Antiquities Policy of 2008, sections 4.2.1 to 6, elaborates on how other stakeholders including government institutions, private sectors and public as a whole should be involved in all activities of conservation and management of PCRs.

Land Acquisition and Resettlement Policy

There is no Resettlement Policy in Tanzania. The resettlement process at TANESCO is guided by the Land Regulations of 2001. The draft National Resettlement Policy Framework which was prepared in 2003 based on the World Bank's OP 4.12 on Involuntary Resettlement requires that:

1. Involuntary resettlement should be avoided or minimized where feasible by seeking viable alternative designs;

If not feasible, resettlement activities should be conceived and executed as sustainable development programs to benefit the PAPs;

Displaced persons should be fully consulted and participate in planning and implementing resettlement programs; and

Displaced persons should be assisted in improving their livelihoods and standards of living to at least pre-displacement.

National HIV/AIDs Policy 2001

The policy objective refers to the prevention of transmission of HIV/AIDs through: -

A) Creation and sustained an increase awareness of HIV/AIDS through targeted advocacy, information, education, and communication for behaviour change at all levels by sectors. This hinges on effective community involvement and empowerment to develop appropriate approaches in prevention of HIV infection, care and support to those infected and affected by the epidemic including widows and orphans.

b) To prevent further transmission of HIV/AIDs through:-

i) Making blood and blood product safe and

ii) Promoting safer sex practices through faithfulness to partnered abstinences, no-penetrative sex, and condom use according towel informed individuals decision. The key issue of moving from abstinences or condom use to another strategy depends on testing in between.

iii) Early and effective treatment of STI's in health facilities with special emphasis on high risk behaviour groups and early diagnosis of HIV infections through voluntary counselling and testing

Occupation health and safety policy 2003

The overall objectives of the 1990 National Health Policy was to improve the health and well being of all Tanzanians, with a focus on those most at risk and to encourage the health system to be more responsive to the

needs of the people. The new 2003 National Health Policy links up with the Government Development Vision and expands on the scope of the health sector policy to include new aspects of human health. Therefore, the

Proponent will observe and comply with the requirements of the National Health Policy throughout the project life cycle.

3.3.3 National Laws

Electricity Act, 2008

The Electricity Act provides the facilitation and regulation of generation, transmission, and transformation, distribution, supply and use of electricity energy, to provide for cross-border trade in electricity and the planning and regulation of rural electrification. Among other things the Act (Part VIII) gives the minister responsible for energy, in consultation with the minister responsible for finance, the authority to restructure the electricity supply industry in order to foster competition for increased efficiency, enhance development of private capital investment and promote regional trading. This project is in hand with the Act as it intends to increase electricity supply and to promote regional trading of electricity between the Nile Basin countries.

Rural Energy Act, 2005

The Rural Energy Act establishes the Rural Energy Board, Fund and Agency responsible for promotion of improved access to modern energy services in the rural areas of mainland Tanzania and through a Fund within the Agency Board to provide for grants and subsidies to developers of the rural energy projects and for related and consequential matters.

The principles of rural energy development (Rural Energy Act, Part II) are, among other things, that modern energy supply to rural areas promotes growth in economic production and productivity as well as social welfare; that sustainable development shall be archived when modem energy services in rural areas are promoted, facilitated and supported through private and community initiative and involvement.

Environmental Management Act, 2004

The Environmental Management Act (EMA) No. 20 of 2004 is the Principle legislation Governing Environmental Management in the country. On February, 2005 the Environment Management Act (EMA), 2004 was assented into law by the President of Tanzania, an act which provides legal and institutional framework for sustainable management of environment, repealing the national Environmental Management Act, of 1983. The law outlines principles for management, impact principles and risk assessment, prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement to provide for implementation of NEP and provide establishment of National Environment Trust Fund and other related matters. The EMA also provides for continued existence of NEMC;

For effective implementation of the NEP objectives, the Act has identified and outlined specific roles, responsibilities and functions of various key players and provides a comprehensive administrative and institutional arrangement, comprised of:-

i. National Advisory Committee;
ii. Minister Responsible for Environment;
iii. Director of Environment;
iv. NEMC;
v. Sector Ministries;
vi. Regional Secretariat;
vii. Local Government Authorities (City, Municipal, District and Town Councils).

Part VI, Sub-section 81(1) of the Act requires a project proponent or developer to undertake an EIA at his/her own cost prior to commencement or financing of the project. The types of projects requiring EIA are listed in the third schedule of the Act. Thus, in that regard the Act prohibits any development to be initiated without an EIA certificate.

Sub-section 86(1) stipulates "… the Council shall upon examination of a project brief, require the proponent of a project or undertaking to carry out an EIA study and prepare an Environmental Impact Statement". According to the Act (Sub-section 1-4) the EIA should be submitted to the Council, which carries out a review through its Technical Review Committee. The Council is also required to make a site visit during the review process for inspection and verification at the proponent's cost.

Environmental Impact Assessment and Audit Regulations, 2005

The Environmental Impact Assessment and Audit regulations (2005) are made under EMA No. 20 of 2004. The regulations provides basis for undertaking EIAs and EAs for various development projects with significant environmental impacts in the country. This section gives a brief description of some provisions in the regulations that are relevant to this study.

Part III of The Environmental Impact Assessment and Audit Regulation deals with project registration and screening procedures. Section 5 requires the registration applicant for Environmental Impact Assessment Certificate to submit a project brief report to the NEMC.

Section 6(1) requires a developer/project proponent to register the project in accordance with format specified. The section also specifies issues to be covered by the proponent in the project brief report. Section 6(3) requires a project brief to be prepared by a registered environmental impact assessment expert.

According to Section 11(1) the proponent is required to undertake an environmental impact assessment if the project brief has no sufficient

mitigation measures or undertake a preliminary assessment if more information is required to determine a screening decision.

Part IV Section 13(1) requires the proponent to conduct an EIA in accordance with the general environmental impact assessment guidelines and in accordance with the steps outlined in the fourth schedule of the regulations. Section 16 specifies EIA study should cover environmental, social, cultural, economic and legal issues.

The first schedule gives list of projects requiring and not requiring EIA. According to the schedule, Type B Projects are those projects that are likely to have some significant adverse impacts but the magnitude of impacts is not well known.

Forest Act (2002)

The Forest Act (No. 14), 2002, provides for the management of forests in order to enhance the contribution of the forest sector to the development of Tanzania and the conservation and management of natural resources. In addition, the legislation fosters ecosystem stability through conservation of the forest biodiversity, water catchments and soil fertility.

Section 18 of the Act requires developers to prepare and submit to the Director of Forestry, an EIA report. The law states that: “any proposed development in a forest reserve, private forest or sensitive forest area including watersheds, whether that development is proposed by or is to be implemented by a person or organization in the public or private sector, the developer shall prepare and submit to the Director an Environmental Impact Assessment of the proposed development”. Section 70 of the Act prohibits any person from burning any vegetation on any land outside the cartilage of his own house or compound without permission.

In addition, Section 49 of the Act outlines various permits that are required when certain activities are undertaken. These activities include:-

- Activities carried out in national and local authority forest reserves;
- Felling or extraction of timber (for domestic use, export, mining purposes or for prospecting and for exploitation of mineral resources);
- Gathering and picking parts or extracts of any protected plant for the purposes of research or the production manufacture of any medicine or product;
- Erection of buildings or other structures;
- Construction of roads, bridges, paths, waterways or runways;
- Plant or cultivate trees, crops or other vegetative matter;
- Enter to hunt or fish.

Wildlife conservation Act no 5 of 2009

35,-(1)Requires every significant physical development in a wildlife Protected Area, the Wildlife Management Area, the buffer zone,

migratory route or Dispersal area to which this section applies, whether that development is prepared by, or is being implemented by a person or organization in the public or private sector, the prospective developer shall prepare and submit to the satisfaction of the Minister responsible for environment a report on Environmental Impact Assessment of the proposed development.

(2) Notwithstanding sub-section (1) or any other law to the contrary, any development to which this section applies shall not commence unless and until an Environmental Impact Assessment certificate has been issued by the Minister responsible for environment.

(3) The developments in a wildlife protected area and Wildlife

Management Areas to which this section applies shall include -

(a) Mining development;

(b) Road construction or lying of pipe lines;

(c) Semi or permanent establishments;

(d) Construction of dams, power stations, electrical and telecommunication installations; and

(e) Such other similar developments or activities as the Director may, for good cause, prescribe.

Water Resources Management Act, 2009

This law provides for an institutional and legal framework for the management and development of water sources. The Act is premised on promoting the principles of the National Water Policy (http://www.ewura.go.tz/pdf/NationalWaterPolicy.pdf) and also deals with ownership and management of water sources. It vests ownership of water sources in the President as trustee and puts in place mechanisms for harvesting and using water. It also establishes a National Water Board and provides for its functions. Among these, is the power to regulate water catchment areas, putting in place water management plans, classification of water resources and restricting the use of water during certain periods. The Act also establishes Basin Water Boards and charges them with the duty of undertaking various works. In the course of discharging their functions, these Boards may, under section 84 (2), acquire lands under the Land Acquisition Act. The Minister may also, under section 112 (2) (f) of the Act, transfer easements registered in water rights (LEAT, 2010).

Land Act No. 4 of 1999

This Act lays down fundamental principles for occupying and using the land. Among them is the principle that any land user shall ensure that land is used productively and that any such use complies with the principles of sustainable development.

Tanzanian land falls under three categories, namely:

- Reserved Land is land set aside for wildlife, forests, marine parks, etc., and the ways these areas are managed is explained in the laws that protect each sector (e.g. Wildlife Conservation Act, National Parks Ordinance, Marine Parks and Reserves Act, etc.). Specific legal regimes govern these lands under the laws used to establish them;
- Village Land includes all land inside the boundaries of registered villages, where the Village Councils and Village Assemblies are given power to manage. The Village Land Act gives the details of how this is to be done;
- General Land is land, which is neither reserved land nor village land and is therefore managed by the Commissioner. The Land Act is governing this land.

The Land Act of 1999 (Section 34) also states that where a right of occupancy includes land which is occupied by persons under customary law, and those persons are to be moved or relocated, they must be compensated for loss of interest in the land and for other losses. They also have the right to reap crops that are sown before any notice for vacating that land is given. The Land Act (Section 156) requires that with regard to communal right of way in respect of way-leave, compensation shall be paid to any person for use of land, who is in lawful or actual occupation of that land, for any damage caused to crops or buildings and for the land and materials taken or used for the works. Requirements for the assessment of compensation are provided in the Land (Assessment of the Value of Land for Compensation) Regulations of 2001. Valuation must be done by a qualified and authorized valuer.

The basic principle governing compensation is that none of the PAP should be made worse off by the project displacements. According to the Tanzanian legislation, market values should be applied when valuing the affected houses and structures. Households losing their residential premises are entitled to an "Accommodation allowance" to cover the cost of renting another premise for up to 36 months, while purchasing or building a new house. In case of no active rental markets, estimation of the monthly renting rates may also need to be done using alternative methods.

Compensation is granted to those having annual and perennial crops, including fruit trees. The values are assessed through a market value approach as proposed in the legislation, in particular under Section 179 of the Land (Assessment of the Value of Land for Compensation) Regulations, 2001 and are available at the Government district valuer's offices.

In the absence of a formal Resettlement Policy, the following legal instruments provide the legal framework for compensation and resettlement in Tanzania:

i. The Land Act (1999);
ii. The Land Regulations (2001);

iii. The Village Land Act (1999);

iv. The Local Government (District Authorities) Act;

v. The Local Government (Urban Authorities) Act;

vi. The Land Acquisition Act (1967);

vii. The Town and Country Planning Ordinance cap 378;

viii. The National Energy Policy of Tanzania (2003);

ix. The Environment Management Policy (1997) and Act (2004).

Village Land Act No. 5 of 1999

The Village Land Act No. 5 of 1999 (URT, 1999) governs village land and all matters related to land tenure under the Village Councils. Section 8 (1), (2) and (3) of the Act empowers the Village Council to manage all village lands in accordance with the principles of a trustee with the villagers being the beneficiaries. In exercising these functions, the Village Council is required to have regard to the following principles:-

- Sustainable development and the relationship between land use, other natural resources and the environment in and contiguous to the village;
- The need to consult with and take account of or comply with the decisions or orders of any public officer or public authority with jurisdiction over any matter in the area where the village is; and
- The need to consult with and take into account the views of other local authorities with jurisdiction over the village.

Although the Village Land Act recognizes the role of the Village Councils in terms of management, most of the land in the villages is under individuals through the customary land rights. The right of the individuals to the land must be recognized and respected and development should not take more than the land it needs for that particular development.

The Land Regulation (2001)

The Land Regulation provides guidance on the issue of compensation. According to Section 10 (1) of the Land (Compensation Claims) Regulation 2001, compensation shall take the form of:

- Monetary compensation;
- Plot of land of comparable quality, extent and productive potential to the land lost;
- A building or buildings of comparable quality, extent and use comparable to the building or buildings lost;
- Plants and seedlings;
- Regular supplies of grain and other basic foodstuffs for a specified time.

The Regulation Assessment of Value for Compensation states "...the basis for assessment of the value of any land shall be the market value

of such land". The market value is arrived at by the use of the comparative method and substantiated by actual recent sales of similar properties or by use of income approach or replacement cost method, in case the property is of special nature and not saleable.

The assessment of the value of land and any improvements will be done by a Qualified Valuer and verified by the Chief Valuer of the Government or his/her representative.

In addition, the Regulation defines affected people that are eligible for compensation/resettlement if some of their properties are affected by a proposed development:-

- Holder of right of occupancy;
- Holder of customary right of occupancy whose land has been declared a hazard land;
- Holder of customary and who is moved or relocated because his/her land becomes granted to another person;
- Holder of land obtained as a consequence of disposition by a holder of granted or customary right of occupancy but which is refused a right of occupancy;
- Urban or peri-urban land acquired by the President.

If the person does not agree with the amount or method of payment or is dissatisfied with the time taken to pay compensation, he/she may appeal to the High Court for redress. If proved justifiable, the High Court shall determine the amount and method of payment, determine any additional costs for inconveniences incurred, and order the plaintiff to be paid accordingly.

The Land Disputes Courts Act No. 2 of 2002

Every dispute or complaint concerning land shall be instituted in the Court having jurisdiction to determine land dispute in the given area (Section 3).

The Courts of jurisdiction include:

- The Village Land Council;
- The Ward Tribunal;
- District Land and Housing Tribunal;
- The High Court (Land Division);
- The Court of Appeal of Tanzania.

The Act gives the Village Land Councils powers to resolve land disputes involving village lands (Section 7). If the Council fails to resolve the dispute, the matter can be referred to the Ward Tribunal as established by the Land Act (1999) and the Village Land Act. If any dispute will arise because of this project, the provision of this Act shall be observed.

Legal Provisions on Pollution

Several environmental standards are relevant to the proposed development. The legal provisions for these standards are provided in the EMA No. 20 Cap 191, which provides directives on environmental standards and compels the National Environmental Standards Committee of the Tanzania Bureau of Standards to develop, review and submit to the Minister (responsible for Environment) for approval standards and criteria covering:

- Water quality;
- Discharge of effluent into water;
- Air quality;
- Control of noise and vibration pollution;
- Sub sonic vibrations;
- Soil quality;
- Control of noxious smells;
- Light pollution, electromagnetic waves and microwaves; and
- Any other environmental quality standards.

The Regulations for Soil Quality Standards are made under Sections 144, 145 and 230 (s) of the EMA Cap 191 and sets out minimum standards for soil quality and identifies contaminants of heavy and other metals including liquids, such as oils. It compels all developers to ensure they do not emit any substances that may contaminate the soil beyond levels that are provided in the laws.

The Regulations for Water Quality Standards are made under Sections 143, 144 and 230 (2) (s) of the EMA Cap.191 to provide for minimum standards of water quality and sets mechanism for the protection of water sources and groundwater. It prohibits discharging hazardous substances, chemicals and materials or oil into water bodies and outlines procedures that have to be followed in sampling and assessing water. In addition to provisions in the EMA Cap 191 and subsequent Regulations, the Local Government Act of 1982 also empowers the local governments to enact by-laws to protect public health and regulate pollution problems.

The Occupational Health and Safety Act (2003)

This Act makes provisions for the safety, health and welfare of people at work. In addition, it provides for the protection of people against hazards to health and safety arising from a work environment. Relevant sections of the Act are Part IV Section 43 (1) - Safe means of access and safe working place ; Prevention of fire ; and Part V on health and welfare provisions, which includes supply of clean and safe sanitary convenience, washing facilities and first aid facility to the workers. Section 15 gives powers to the Registrar of factories and workplace to enter any factory or workplace to perform his duties as provided by the Act. Section 16 requires that factories and workplaces should register

with Registrar of factories and workplaces before commencing operations.

Part VI deals with special safety provisions for working places involving handling hazardous chemicals, hazardous processes or hazardous equipment. The need to ensure that all workers and workstations adhere to the laws is imperative. Personal protective gear should be worn at all time by workers. As a matter of compliance to the Act, all workers should be provided with safety gear including hard-hat, gloves and special clothes for a particular work. The proposed project will have to adhere to this Act during construction phase of the project.

Disclosure Requirements

The EMA 2004 of the United Republic of Tanzania has provisions for public consultation and disclosure described in the following Sections:-

- Section 89: Public Participation in Environmental Impact Assessment;
- Section 90: Public Hearing and Information Disclosure.

The Environmental Impact Assessment and Audit Regulations 2005 of the United Republic of Tanzania provide rules and regulations for Public Consultation and Disclosure as follows:

- Part IV, Regulation 17, Public Participation;
- Part VI, Regulation 23, Invitation of comments from relevant Ministries, Institutions and the general public;
- Part VI, Regulation 27, Public Hearing.

HIV and AIDS (Prevention and Control) Act (2008

The HIV and AIDS prevention and control act No. 28 of 2008 section 4 requires every person, institution and organization living, registered or operating in Tanzania shall be under general duty to:-

- Promote public awareness on cases, mode of transmission, consequences, prevention and control of HIV and AIDS
- Reduce the spread of HIV AIDS, prevalence of STI in population and adverse effect of HIV and AIDS
- Prohibit compulsory HIV test unless provided for, fighting stigma and discrimination
- Increase access care and support person living with HIVAIDS
- Prevent tradition and culture subject to increase spread of HIV and promote tradition and culture subject to stop HIV AIDS spread

3.4 International Funder Policies, Procedures and Guidelines

3.4.1 Regional Organizations Relevant to the Project: East African Community Treaty

The treaty unifying the three East African Countries of Kenya, Uganda and Tanzania (and now includes Rwanda and Burundi) was signed in November, 30th 1996 by the presidents of the respective countries. Article 101 on Energy states as follow: “The partner states shall adopt policies and mechanisms to promote the efficient exploitation, development, joint research and utilization of various energy resources available within the region.” For the purposes of the above article, the partner states undertook to promote within the community:

- Least cost development and transmission of electric power, efficient exploitation of fossil fuels and utilization of new and renewable energy sources;
- Joint planning, training and research in, and the exchange of information on the exploration, exploitation, development and utilization of available energy resources;
- Development of integrated policy on rural electrification;
- Development of inter-partner state electrical grid inter-connections;
- Construction of oil and gas pipelines;
- Other measures to supply affordable energy to their people taking cognizance of the protection of the environment as provided for by this treaty.

Therefore the proposed 400 kV dual-circuit transmission line and concerns about rural electrification are in line with the provisions of this treaty of the East African countries.

3.4.2 International Agreements and Treaties

Tanzania is a signatory to several international treaties, Cites, IUCN, Ramsar inclusive the Word bank policies etc NEMC policies comply with these in the environmental conservation and are mainstay and tools in development projects initiatives.

3.4.2.1 African Development Bank

The environmental and social policies of the African Development Bank (AfDB) were developed over the years and evolved to support the main objective of the AfDB to provide assistance to African Regional Member Countries in their economic and social development. To reach this objective, the AfDB will ensure that environment and gender issues are mainstreamed in each broad sectoral area and in a fully participatory manner. The AfDB’s policies and guidelines applicable to the project are the following:

- Policy on the Environment, 2004;
- Involuntary Resettlement Policy, 2003;
- Gender Policy, 2001;
- Integrated Environmental and Social Impact Assessment Guidelines, 2003.

Policy on the Environment, 2004

The environment policy framework has been anchored in the concept of sustainable development and recognizes that economic growth will be the main engine of growth in Africa, and will aim to ensure its sustainability by preserving and enhancing the ecological capital that nurtures such growth.

The policy sets out the broad strategic and policy framework under which all AfDB operations will henceforth be made. The traditional sector-by-sector approach in the management of natural resources has been replaced by cross-sectoral environmental policy actions based on an integrated approach where the participation of a wide spectrum of stakeholders in protecting and managing the environment is essential. In addition, the policy has the goal to strengthen existing environmental assessment procedures and develop new environmental management tools.

Involuntary Resettlement Policy, 2003

AfDB has put the Involuntary Resettlement Policy in place and this covers involuntary displacement and resettlement of people caused by an AfDB financed project. This policy applies when a project results in relocation or loss of shelter by the persons residing in the project area, assets being lost or livelihoods being affected. The primary goal of the Involuntary Resettlement Policy is to ensure that when people must be displaced they are treated equitably, and that they share in the benefits of the project that involves their resettlement. The objectives of the policy are to ensure that the disruption of the livelihood of people in the project's area is minimized, ensure that the displaced persons receive resettlement assistance so as to improve their living standards, provide explicit guidance to AfDB staff and to borrowers, and set up a mechanism for monitoring the performance of the resettlement programs. Most importantly, the resettlement plan should be prepared and based on a development approach that addresses issues of the livelihood and living standards of the displaced person as well as compensation for loss of assets, using a participatory approach at all stages of project design and implementation.

Compensation at the full replacement cost for loss of lands and other assets should be made before projects implementation. The improvement of these living standards should also apply to host communities. In addition, the needs of disadvantaged groups (landless, female headed households, children, elderly, minority groups, religious and linguistic groups, etc.) must be at the centre of the development approach. Economic benefits and costs should be applied to determine project feasibility with regard to resettlement. The full costs of

resettlement activities necessary to achieve the objectives of the project should be included in the total costs of the project. The costs of resettlement like the costs of other project activities are treated as a charge against the economic benefits; and any net benefits to resettles (as compared to the "without-project" circumstances) should be added to the benefits stream of the project.

Economic and social considerations should be taken into account in determining the requirements for compensation. Under the present policy, only displaced population having formal legal rights to land or assets and those who can prove entitlement under the country's customary laws are considered and will be fully compensated for loss of land or other assets. However, a third category of displaced persons who have no recognizable legal right or claim to the land they are occupying in the project area will be entitled to resettlement assistance in lieu of compensation for land. Land, housing, and infrastructure will be provided to the adversely affected population, including indigenous groups, religious, linguistic, and other minorities, as well as pastoralists who may have usufruct rights to the land or other resources taken for the project.

The developer will be required to prepare a full resettlement plan for any project that involve a significant number of people (200 or more persons) who would need to be displaced with a loss of assets, or access to assets or reduction in their livelihood. For any project involving the resettlement of less than 200 persons, an abbreviated resettlement plan will be produced. According to the AfDB's disclosure policy and the AfDB's Environmental and Social Assessment Procedures (ESAP, 2001) a full resettlement plan and the abbreviated resettlement plan should be posted in the AfDB's Public Information Centre and the AfDB's web site for public review and comments.

Gender Policy, 2001

The goal of the policy is to promote gender equality and economic and social development in Africa. Gender is singled out as a priority cross-cutting issue which must permeate all AfDB operations and the AfDB has to work closely with Regional Member Countries to mainstream gender and promote measures that will lead to the empowerment of women. The focus of the policy is on gender equality as a development goal rather than on women as a target group.

Integrated Environmental and Social Impact Assessment Guidelines, 2003

The major objective of these guidelines is to provide reference material to the staff of the AfDB and Regional Member Countries on how to adequately consider cross-cutting themes while assessing the environmental and social impacts of a project. Moreover, the guidelines can greatly assist in the project design, as many potential adverse impacts can be avoided or mitigated by modifying or adding certain project components to the initial design. As well, improvements in the project design can enhance several beneficial impacts at a minimal cost. Appendix 8 of the guidelines is related to the specific sector of hydropower production, transportation and distribution and includes the typical environmental and social issues to consider in the description of

the project environment, and the most frequent potential impacts and enhancement/mitigation measures that should be integrated as early as possible, preferably in the project design.

3.4.2.2 World Bank Safeguard Policies

The World Bank environmental and social conservation policies include both Operational Policies (OP) and the Bank's Procedures (BP). Conservation policies are designed to protect environment and society against potential negative effects of projects, plans, programs and policies. Environmental policies applicable to the project are the following:

- OP 4.01 Environmental Assessment, including public participation;
- OP 4.04 Natural Habitats;
- OP 4.36 Forests;
- OP 4.12 Involuntary Resettlement;
- OP 4.10 Indigenous People;
- OP 4.11 Physical Cultural Resources;
- OP 17.50 Public Disclosures.

OP 4.01 Environmental Assessment

The purpose of OP 4.01 is to make sure that projects funded by the Bank are environmentally feasible and viable, and that decision making are improved through appropriate analysis of actions and their probable environmental impacts (OP 4.01, para 1). This policy is triggered if the project is likely to cause potential (negative) environmental risks and impacts in its zone of influence. OP 4.01 covers impacts on the physical environment (air, water and land); life environment, health and safety of populations; cultural and physical resources; and environmental concerns at the trans-boundary and world levels. Social aspects (involuntary resettlement, indigenous populations) as well as natural habitats, pest control, forestry and safety of dams are addressed by separate policies with their own requirements and procedures.

The Bank undertakes environmental screening to determine the appropriate extent and type of environmental assessment to be conducted. The Bank classifies the proposed projects into categories, depending on the type, location, sensitivity, and scale of the projects and the nature and magnitude of their potential environmental impacts.

The categories are:-

- Category A: Projects with potential significant adverse social or environmental impacts that are diverse, irreversible or unprecedented;
- Category B: Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures;

- Category C: Projects with minimal or no social or environmental impacts.

In the present case, the project should be classified in the category A. The environmental assessment will thus have to examine the project's potential negative and positive environmental impacts and recommend any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

For all Category A and B projects, during the environmental assessment process, project-affected groups and local NGOs have to be consulted about the project's environmental aspects and their views must be taken into account. The consultations must be initiated as early as possible. These groups should be consulted shortly after environmental screening and before the terms of reference for the EA are finalized; and once a draft EA report is prepared. Consultations can also be conducted throughout project implementation to address related issues that affect them. For meaningful consultations, all relevant material has to be provided in a timely manner prior to consultation and in a form and language that are understandable and accessible to the groups being consulted.

OP 4.04 Natural Habitats

The conservation policy 4.04 aims at protecting natural habitats and their biodiversity and ensuring sustainability of services and products that natural habitats supply to human societies. In principle, the World Bank refuses to finance what may be perceived as causing significant damages in whatever Critical Natural Habitat (CNH). It seeks as much as possible to avoid financing, through projects, conversions or degradations of natural habitats (non-critical), or at least without reconsidering the project even in its size or its extension, or without putting in place acceptable mitigation measures, such as establishing a protected area or strengthening effective protection of CNHs. Should the project involve the significant conversion or degradation of natural habitats that are not considered as critical, and if there is no alternative solution for the project and its location, and if the complete analysis clearly shows that the project's overall benefits are significantly higher than the environmental costs, then the WB can finance the project on condition that it includes appropriate mitigation measures.

The World Bank defines natural habitats as land or water zones where biological communities sheltered by ecosystems are in majority made of indigenous plant and animal species, and where human activity did not fundamentally modify the zone's main ecological functions.

CNHs are defined as:-

- Existing protected areas and areas officially proposed by governments to be classified among «protected areas», e.g. reserves that meet the criteria of the International Union for Conservation of Nature (IUCN) classifications;
- Areas traditionally recognized as protected by traditional local communities;

- Sites maintaining vital conditions for the viability of such protected areas.

The zones that may be considered as CNHs in the project area are the existing national parks, forest reserves, game reserves, wildlife corridors, dispersal areas and migratory routes. Some of these areas are crossed by the transmission line.

OP 4.36 Forests

The Operational Policy 4.36 is about forest protection. The major objectives of the policy are:

- Sustainable management of forests;
- Conservation of wet forest zones;
- Respect for rights of communities in using their traditional forest zones in a sustainable manner.

The Bank does not finance projects that, according to it, would involve significant conversion or degradation of critical sections of forests or essential (critical) natural habitats attached to them. Should the project involve the significant conversion or degradation of natural forests or associated natural habitats that are not considered as critical, and if there is no alternative solution for the project and its location, and if the complete analysis clearly shows that the project's overall benefits are significantly higher than the environmental costs, then the Bank can finance the project on condition that it includes appropriate mitigation measures.

It is expected that the project will cross the acacia woodland from Namanga to Longido estimate 35km, scattered patches of wooden glass land from Monduli Military to Minjingu, then cross a patch of 10 km of palm acacia wood land between Tarangire and Manyara National park, then 5km patch of acacia woodland after Katesh on the small scarp, and at last 20km on heavily disturbed miombo {average of 3m height and 3cm diameter to Singida. Hardly the whole way leave from Namanga to Singida will remove< 1500 trees of over 30 cm breast heights at and of over 25m height; thus the project won't affect significantly any forested areas.

OP. 4.12 Involuntary Resettlement

The World Bank Resettlement Policy (OP 4.12) main objectives are to:-

- Avoid or minimize involuntary resettlement whenever feasible;
- Develop resettlement activities as sustainable development programs, providing sufficient investment resources to enable the displaced persons to share in project benefits;
- Meaningfully consult displaced persons and give them opportunities to participate in planning and implementing resettlement programs;
- Assist displaced persons in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to

pre-displacement levels or to levels prevailing prior to the beginning of project implementation whichever is higher.

This policy is usually applied for projects that require international financing. The World Bank OP 4.12, Annex A (Paragraphs 17-31), describes the scope (level of detail) and the elements that a resettlement plan should include. These include objectives, potential impacts, socioeconomic studies, legal and institutional framework, eligibility, valuation and compensation of losses, resettlement measures, relocation planning, community participation, grievance management procedures, implementation schedule, costs and budgets, and monitoring and evaluation. This report conforms to the Bank's policy requirement on content and structure.

WB OP 4.12.(6a) requires that the resettlement plan includes measures to ensure that displaced persons are (i) informed about their options and rights, (ii) consulted on, offered choices among and provided with technically and economically feasible resettlement alternatives, and (iii) provided prompt and effective compensation at full replacement costs.

WB OP 4.12 (8) requires that particular attention should be paid to the needs of vulnerable groups among those displaced such as those below the poverty line, landless, elderly, women and children, as well as indigenous populations and minorities.

WB.OP 4.12 (13 a) stipulates that any displaced persons and their communities and any host communities receiving them should be provided with timely and relevant information, consulted on resettlement options and offered opportunities to participate in planning, implementing and monitoring the resettlement.

WB OP4.12 (12a) states that payment of cash compensation for lost assets may be appropriate where livelihoods are land-based but the land taken for the project is a small fraction (less than 20%) of the affected asset and the residual is economically viable.

WB OP4.12 Para (6 b & c) state that in case of physical relocation, displaced persons should be (i) provided assistance (such as moving allowances) during relocation; and (ii) provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, location advantages, and other factors is at least equivalent to the advantages of the old site.

In addition displaced persons should be offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; and provided with development assistance in addition to compensation measures such as land preparation, credit facilities, training, or job opportunities.

WB OP4.12 Para 13 (a) requires that appropriate and accessible grievance mechanisms are established to sort out any issues arising.

OP/BP 4.10 Indigenous Peoples

The objectives of this policy are to ensure that:

- The development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples;
- Adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and
- Indigenous peoples receive culturally appropriate and gender and intergenerational inclusive social and economic benefits.

OP/BP 4.11 Physical Cultural Resources

This policy assists in preserving PCRs and helps reduce chances of their destruction or damage. The policy considers PCRs to be resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic or other cultural significance. According to this policy, an investigation and inventory of PCRs likely to be affected by the project, the documentation of the significance of such PCRs and assessment of the nature and extent of potential impacts on these resources have to be conducted. Since many cultural resources are generally not well documented, or protected by law, consultation is an important means of identifying PCRs. Such consultations include meetings with project-affected groups, concerned government authorities and relevant non-governmental organizations.

If PCRs are found during the inventory, a management plan must be prepared. This management plan includes measures to avoid or mitigate any adverse impacts on PCR, provisions for managing chance finds, any necessary measures for strengthening institutional capacity for the management of PCR, monitoring system to track the progress of these activities. Finally, whether or not a PCR is found, provisions for managing chance finds must be implemented to ensure that PCR that may be discovered is properly handled.

BP 17.50 Public disclosures

According to the World Bank's policy on disclosure of public information, whenever an environmental assessment is required by the World Bank, an environmental assessment report must be prepared as a separate, free-standing document. This report must then be available at a public place accessible to project-affected groups and local NGOs in accordance with OP/BP 4.01, Environmental Assessment. In addition, whenever a Resettlement Instrument (RI) or Indigenous Peoples' Development Plan (IPDP) is required by the World Bank, an RI or IPDP must be prepared as a separate, free-standing document. The document must then be available at a place accessible to, and in a form, manner and language understandable to the displaced or affected people and local NGOs.

3.5 Climate Change

Both Kenya and Tanzania have signed the Kyoto accord by which they accept to participate in this international effort to reduce Greenhouse Gas (GHG) emissions (NEMA, 2005; United Republic of Tanzania, 2003). Kenya 2013 Vision acknowledges the need to generate environmental friendly, cost effective and energy efficient sources of electricity, geo-thermal plant in pipeline in one way Kenya considers reducing its GHG production.

Importing the excess of electricity produced in Tanzania can help reducing GHG emissions in Kenya. Besides producing electricity, importation is one of the ways Kenya will have access to the needed power for its development, as proposed in the Least Cost Power Development Plan (Republic of Kenya, 2011). Indeed, and as shown in the Feasibility study (RSWI, 2012), Kenya would have to produce 2 320 MW of electricity mainly through coal fuel plants (52% or 1 200 MW) and geothermal (48% or 1 120 MW) to meet its power demand amid 2014 - 2031. The construction and operation of these plants would produce, especially in the case of coal power plants, a large amount of greenhouse gas (coal produces 955 g of CO_2 per kWh (Rybach, 2010). Improved access to electricity for both countries will also reduce the use of firewood for cooking and heating, which represents a significant source of deforestation, contributing to climate change. In addition, access to electricity can reduce the use of private generators and kerosene lamps, which also produce GHG.

CHAPTER FOUR

4.0 ENVIRONMENTAL AND SOCIAL BASELINE

4.1 General Description

4.1.1 Arusha Region

Arusha region is one of the 30 regions of Tanzania. It covers a total area of 49 329 km^2. This region lies below the Equator, between latitudes 2^o and 6^o South. Longitudinally, the region is situated between 35^o and 38^o East. It is located in the northern part of Tanzania, where it shares its northern border with the most southern region of Republic of Kenya. To the North-East, the Arusha region borders the Kilimanjaro and Tanga regions to the East, while the Manyara region makes the southern border. To the West lies the Shinyanga region and to the North-West is the Mara region. The Arusha region is divided into five administrative districts: Arumeru, Longido, Karatu, Monduli and Ngorongoro.

Arusha town is the capital of the region and the major tourism city in Tanzania. According to the National Bureau of Statistics (2012), the region has a population of 1,644,310 individuals.

4.1.2 Manyara Region

Manyara region was established in 2002. It was formed by combining parts of the former Arusha and of Dodoma regions. This region takes its name from Lake Manyara, which is one of the major lakes in the Great Rift Valley. It is the only region in Tanzania to be bisected in two by the Great Rift Valley.

Manyara region lies between latitudes 3^o 40' and 6^o 0' South and longitudes 33^o and 38^o East. The region has an area of 50 836 km^2, with 49,576 km^2 of dry land and 1 260 km^2 covered with water. It is bordered by the Arusha region to the North, the Kilimanjaro and Tanga regions to the East, the Dodoma region to the South and the Singida and Shinyanga regions to the West.

The regional headquarters are situated in Babati town, which is located some 167 km South from Arusha, 163 km North from Singida and 264 km North-West from Dodoma. There are five administrative districts: Babati, Hanang, Kiteto, Mbulu and Simanjiro.

According to the National Bureau of Statistics (2012), the Manyara region is estimated to have a total population of 1,425,131 individuals.

4.1.3 Singida Region

Singida region lies at 3.54^o to 7.34^o latitude South and 33.27^o to 37.26^o longitude East. It is among the centrally positioned regions in Tanzania and is bordered by four regions namely: Manyara to the North-East, Dodoma to the East, Tabora to the West and Shinyanga to the North-

West. It is bordered to the South by the Morogoro and Iringa regions. Much of the region is a plateau rising gradually from some 830 m in Bahi Swamps to 2 000 m above sea level in the highlands. The Singida region has four rural districts namely: Singida Rural, Manyoni, Iramba and Singida Municipal.

The region has a total population of 1,370.637 people according to the National Bureau of Statistics (2012).

4.2 Natural Environment

4.2.1Climate

Despite its proximity to the Equator, Arusha's elevation of 1 400 m on the southern slopes of Mount Meru keeps temperatures relatively low and alleviates humidity. Cool dry air is prevalent for much of the year. Temperature ranges between 13 and 30°C, with an average of about 21ºC and a lowland temperature average of 26ºC. Rainfall ranges from 250 mm to 1 200 mm per annum. It has distinct wet and dry seasons, and experiences an eastern prevailing wind from the Indian Ocean.

Manyara region experiences varying climatic conditions ranging from moderately wet to drier conditions further South. Temperatures are relatively low, with high temperature amplitude of about 10ºC. Cool dry air is prevalent for much of the year, particularly at night, with an average of about 21ºC and a lowland temperature average of 27ºC. Rainfall ranges from 250 mm to 900 mm per annum. The region experiences distinct wet and dry seasons, with long dry seasons due to low rainfall received per year.

Singida region has an arid climate with temperature ranging between 26ºC and 30ºC. The rain season starts in October and ends in May and the average annual rainfall is about 600 mm.

4.2.2 Geology, Topography and Soil Conditions

Arusha Region

Geologically, the Arusha region falls within the Kenya Rift which is the segment that extends from Lake Turkana to northern Tanzania and covers the entire Arusha region and Kilimanjaro. The formation of the Kenya Rift started about early Miocene in the North, around Lake Turkana. It then migrated southwards, being active from about middle to late Miocene for the central segment. The development of the Rift occurred largely within the Late Proterozoic, at the basement of the Mozambique belt and close to the eastern margin of the Tanzania craton. The Quaternary period saw the development of many large shield volcanoes of silicic composition in the axis of the Rift.

Activity in the southern Kenya and northern Tanzania segment of the Kenya Rift is dominated by alkaline and carbonatite volcanism, of which Ol'Doinyo Lengai is well known (Omenda, 2010). Alkaline lavas are

predominant in the areas around Kilimanjaro where micro-rift grabens occur near Arusha and further South (Omenda, 2010). The entire length of the Kenya Rift, from Lake Turkana in the North to northern Tanzania, has young volcanoes. The youthfulness of the volcanoes attests the active magmatism under the Rift (Omenda, 2010). Similarly, geothermal manifestations are more abundant and stronger within the Rift and, in many cases; they are associated with the young Quaternary volcanoes.

Arusha region is formed of various landscapes ranging from mountains, Rift valley to plains, encompassing famous national parks, a Game Controlled Area, a Ramsar site, a Wildlife Management Area (WMA), and the Ngorongoro Conservation Area (NCA). Ol'Doinyo Lengai is an active volcano located North of Ngorongoro. Altitudes throughout the region vary widely, but much of it ranges from 900 to 1 600 m in elevation. Mount Meru, the second highest mountain in Tanzania after Kilimanjaro, peaks at 4 655 m. Other geographical features include the Lelatema Mountains and the Umba Valley. Situated below Mount Meru, on the eastern edge of the eastern branch of the Great Rift Valley, Arusha is sufficiently watered. The region has several rivers and streams that flow year around. The Great Rift Valley dissects through the middle of the region north-to-south.

Soils of the region are derived from underlying parent rocks and therefore almost all soils found in the area are basaltic in origin. Three main soil groupings are described: highlands soil type, short grass plains and southwest soil types. The highlands types of soils are derived from basaltic lavas giving a high fertility and porous nature to the soils. These soils support the montane forest seen on the mountain slopes, crater slopes, Monduli hill slopes and base of the Rift cliff. The short grass plain type of soils characterizes the extensive plain that extends into the Serengeti Plain, Enduimet plain (including Lake Natron Game Controlled Area and Enduimet WMA) that extends to the foothills of Mount Kilimanjaro, and Mount Meru on the Tanzanian side and Amboseli National Park on the Kenyan side.

These alkaline soils have a calcareous tuff, usually 0.5 to 1 m thick, covered by a shallow layer of volcanic dust. This type of soil forms a hardpan, which retain water close to the surface during rainy season. Several species of grasses flourish in these types of soil, supporting the migratory animals on plains (NCA GMP, 2006). The soils in the South-West consist of vertisols derived from the calcareous tuff, which are less fertile than soils found elsewhere, in particularly west of NCA (NCA GMP, 2006).

Manyara Region

Being part of the eastern Rift, the Manyara region shows similar geological characteristics as the Arusha region. The Manyara region however, presents few mountains and volcanic activities. Manyara region comprises various landscapes ranging from mountains, Rift valley to plains encompassing Lake Manyara and Tarangire National Parks as well as Burunge Wildlife Management Area.

As for the Arusha region, the soils are derived from underlying parent rocks and therefore almost all soils found in the area are basaltic in

origin. Three main soil groupings are described as highlands soil type, short grass plains and southwest soil types. The highlands types of soils are derived from basaltic lavas giving a high fertility and porous nature to the soils. The short grass plain type of soils rich in clay content characterized the extensive plain, Burunge Wildlife Management Area that extend to the foothills of Mbulu hills.

Singida Region

The geology of the Singida region is composed of granite rocks (JICA, 2006) and the Rift valley is the main geological feature in the area. The geological map of the area shows a number of faults in the adjoining land which are also considered very important for groundwater recharge. In fact, geophysical investigations (MoWI, 1998) have shown that there are two faults in Kisasida village, which lies along the Singida – Arusha transmission line. These faults are believed to be responsible for a host of springs in the village (MoWI, 1998). Rock outcrops of granitic nature can also be seen in the area and vegetation grows on a thin soil layer. The rock outcrops and this soil layer have caused the area to have only scattered bushes and limited number of well grown trees. This has made the land less suitable for agriculture or wild animal habitats.

4.2.3 Surface and Groundwater Resources

4.2.3.1 Brief on watershed areas

Arusha region has a number of surface water resources including lakes, such as Lake Natron, Lake Ndutu, Lake Eyasi and Lake Duruti. Similarly, rivers and small streams flowing from highlands such as Themi and Usa Rivers, and several small streams supply water to the region. Many areas of Arusha region enjoy a good water supply from different spring and river sources. The dryer areas in the South, such as Monduli District – which is part of Arusha region – and especially between E11E at Namanga and E32, and far West are served by shallow wells and boreholes, but face considerable water shortage, particularly during the dry season. The districts of Karatu, Arumeru and Arusha town are well served by a number of streams and rivers flowing from the forested catchment area of Mount Meru, Ngorongoro and Themi.

Manyara region has a number of surface water resources including lakes, such as Lake Manyara, Lake Babati, Lake Balangdaleruu, Lake Bassotu, Lake Burungi (Photo 13) and Lake Tlawi. Rivers and small streams, flowing from highlands such as Mbulu highlands, flow into Lake Manyara, which is one of the major freshwater streams feeding the soda lake. However, the region is one of the driest regions especially in the South where it borders the Singida region, experiencing semi-arid climatic condition. Singida region has few surface water bodies, including Singidan and Kindai lakes.

Photo 13: Lake Burungi, Babati District

4.2.4 Vegetation

The vegetation is diversified and has been shaped by rainfall and topography.

Arusha Region

Basically, Arusha region receives more rainfall in its eastern part and on highlands, which gives rise to forest and highland grassland. The lower grounds and the plains in the West, North-East, North and all other areas falling on the shadows of the highlands and mountains, experience drier conditions and support open woodlands, bush lands and open grassland communities. Forests are restricted to the wetter slopes of Mount Meru and Ngorongoro Crater slopes, degrading into scrubland where rainfall is below 900 mm per year. The vegetation types at higher altitude are classified broadly as undifferentiated montane forests whereas those at lower altitude are classified as dry transitional montane forests. Highland shrubs and grasslands are dominated by tussock grass (*Heteropogon contortus*) with variable shrub-herb composition particularly in Ngorongoro Crater. This grassland is dominated by *Eleusine jaegeri* at an altitude above 2 200 m and *Pannisetum sphacelatum* at lower altitudes. Bush land and woodland form the climax vegetation of the NCA, and are made up of *Acacia - Commiphora* communities with different stand characteristics constituting of *Acacia lahai* stand, *Acacia xanthophloea* stand, *Acacia drepanolobium* stand, *Acacia tortilis* stand and *Acacia mellifera-Commiphora* stand.

Open woodlands degrading into open wooded grasslands are characteristic of the northern plain in Namanga, which borders Kenya. This vegetation characterizes large part of the Lake Natron Game Controlled Area and the Enduimet Wildlife Management Area extending from the slope of Mount Kilimanjaro. Open grassland dominates the lower slopes and the plain descending from Monduli hills and the southern plain, in some section dotted with *Acacia* sp. and *Commiphora* sp. woodland further South. The grassland vegetation type, on the

western side, differentiates into woodland dominated by the same species on hills toward Lake Manyara National Park. In areas forming the outskirt of Arusha town, the natural vegetation has been converted mostly into maize and wheat farms and settlements. Further West, the *Acacia – Commiphora* woodland with some *Cordia sinenses* is evident. The existing transmission line from Arusha to Singida crosses open woodland characterized by *Acacia-Commiphora, Combretum*, regenerating miombo woodland kind of vegetation. The dominant species include *Acacia melifera*, *Acacia polyacantha*, *Acacia hockii*, *Acacia seyar* and *Commiphora africana*.

The dominant shrubs recorded in this region include *Grewia bicolour*, *Grewia smiles*, *Combretum* ssp., *Acacia brevispica*, *Maerua angorensis* and *Acacia senegal*. The ground cover is mainly grassy with some forbs and herbs. The characteristic grass species are *Andropogon greenwayi*, *Themeda triandra*, *Digitaria scalarum* and *Aristida* ssp. forming a grazing ground for domesticated and migrating wild animals. Herb layer is characterized by *Helichrysum schimperi*, *Lippia javanica*, *Lupinus princei*, *Hypericum revolutum*, *Crotalaria* ssp., and *Hermanis verucosa*. On the edge of the lake and streams, *Panicum maximum*, *Cyper*us sp., reeds and *Fragmatis* sp. are characteristic species.

Manyara Region

Manyara region has more forest on the north-eastern part, in the Mbulu highlands that form the catchment of the few rivers emerging from the region. As for the Arusha region, the lower grounds and the plains in the West, North-East, North and all other areas falling on the shadows of the highlands experience drier conditions where rainfall is below 900 mm per year and support open woodlands, open grasslands and bush lands degrading into scrubland communities.

Open woodland, degrading into open wooded grassland, characterizes large part of the region from Tarangire National Park area, the Burunge Wildlife Management Area and further South. Open grasslands dominate in parts of the region, although they are interrupted by wooded to bushed grassland especially accelerated by human activities, such as cultivation and habitation. *Salvadora persica*, *Cordia sinensis*, *Grewia mollis*, *Grewia bicolor*, *Acacia brevispica* and *Acacia mellifera* are characteristic species. In lowlands with a high water table, *Hyphae compresus* and *Borasus aethiopicum* are seen as emergent trees in *Acacia-Commiphora* woodland intermixed by *Dalbergia melanoxylon*. As for the Arusha region, the dominant shrubs recorded include *Grewia bicolour*, *Grewia smiles*, *Combretum* ssp., *Acacia brevispica*, *Maerua angorensis* and *Acacia senega*l. The ground cover is mainly grassy with some forbs and herbs. The characteristic grass species are *Andropogon greenwayi*, *Themeda triandra*, *Digitaria scalarum* and *Aristida* ssp. forming a grazing ground for domesticated and migrating wild animals. Herb layer is characterized by *Helichrysum schimperi*, *Lippia javanica, Lupinus princei*, *Hypericum revolutum*, *Crotalaria* ssp., and *Hermanis verucosa.* On the edge of the lake and streams, *Panicum maximum*, *Cyperus* sp., reeds and *Fragmatis* sp. are characteristic species.

Photo 14: Acacia- Grewia Bushes with isolated Adensonia digitata

Singida Region

The characteristic vegetation of the central region of Singida is of "bush" or thicket type, which is widespread throughout the area wherever the natural plant cover has been altered by biotic factors. Depressions and seasonally wet areas with impeded drainage support grasses and sometimes a mixture of grasses mixed with woody plants. Wherever the natural vegetation has been altered by agricultural activities, regenerating bushes, mixed with annual herbs and grasses, form a type of induced vegetation. Most of the hill ranges, steep slopes and protected forest reserves are covered with large woody plants, which form good watershed protective covers.

4.2.5 Wildlife

Arusha and Manyara Regions

Wildlife sanctuary, game controlled areas and national parks in the Arusha and Manyara regions are rich in both large and small mammals as well as birds. Common wildlife in these protected areas includes wildebeests, zebras, elephants, elands (*Taurotragus oryx*), giraffes, Grant's gazelle (*Gazella grantii*), lions, cheetahs, leopards, hyenas, impalas (*Aepyceros melampus*) and buffalos (*Syncerus caffer*). Rare species such as oryx (*Oryx* sp.) and lesser kudu (*Tragelaphus imberbis*) can be seen in some areas, particularly in Ngorongoro Conservation Area and Tarangire National Park. Rhinos can also be seen in Ngorongoro Conservation Area.

Primates, small mammals, reptiles, amphibians and woodland and forest birds can also be spotted in these two regions. Outside the protected areas, wildlife populations are low but are generally highly visible owing to the nature of the terrain. Similarly, aquatic birds such as Egyptian geese (*Alopochen aegyptiacus*), lizards, greater flamingo

(*Phoenicopterus roseus*) and many other water birds are commonly seen on wetlands and on Lakes Natron, Manyara, Babati, Bassotu, Tlawi and Burunge.

Photo 15: Common Wildlife in the Burunge WMA-Babati District

Singida Region

Singida region has fewer game animals when compared to Arusha and Manyara regions. Wildlife resources, in terms of large and small mammals, are found in Tarangire National Park, in the Manyara district, as well as in game and forest reserves. These reserves, bushes and wooded hills provide suitable habitats for those animals.

4.2.6 Wildlife and migratory birds Corridors

Wildlife corridors can be described as biological corridors, which are essential for the genetic survival of wildlife and can be compared to lifelines for the animals. Wildlife migration is an instinctive movement that takes place daily due to water and pasture needs or annually due to climatic changes. Migration corridors (Map 5.1) establish connections between different habitats and enable unrestricted movement of wild animals. In the project area, they are being destroyed by rapid agricultural expansion, unplanned land use strategies, unmanaged natural resource extraction activities, increased bush meat trade and road construction.

From Namanga the way leave crosses three wildlife corridors and traverse parallel or sharing dispersal areas with the fourth. Categorically the Amboselli (in Kenya) Kilimanjaro National Park Natron (in Tanzania) Corridor is a trans-boundary corridor, which necessity the collaboration of the two states

Under the undersign Conservation of *Depositary's Original* Migratory Species of Wild Animals (CMS) Tanzania and Kenya are signatories.

Under CMS translations:-.

i) "Migratory species" means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries;

ii) "Conservation status of migratory specie wildlife's" means the sum of the influences acting on the migratory species that may affect its long-term distribution and abundance;
iii) "Conservation status" will be taken as "favourable" when:

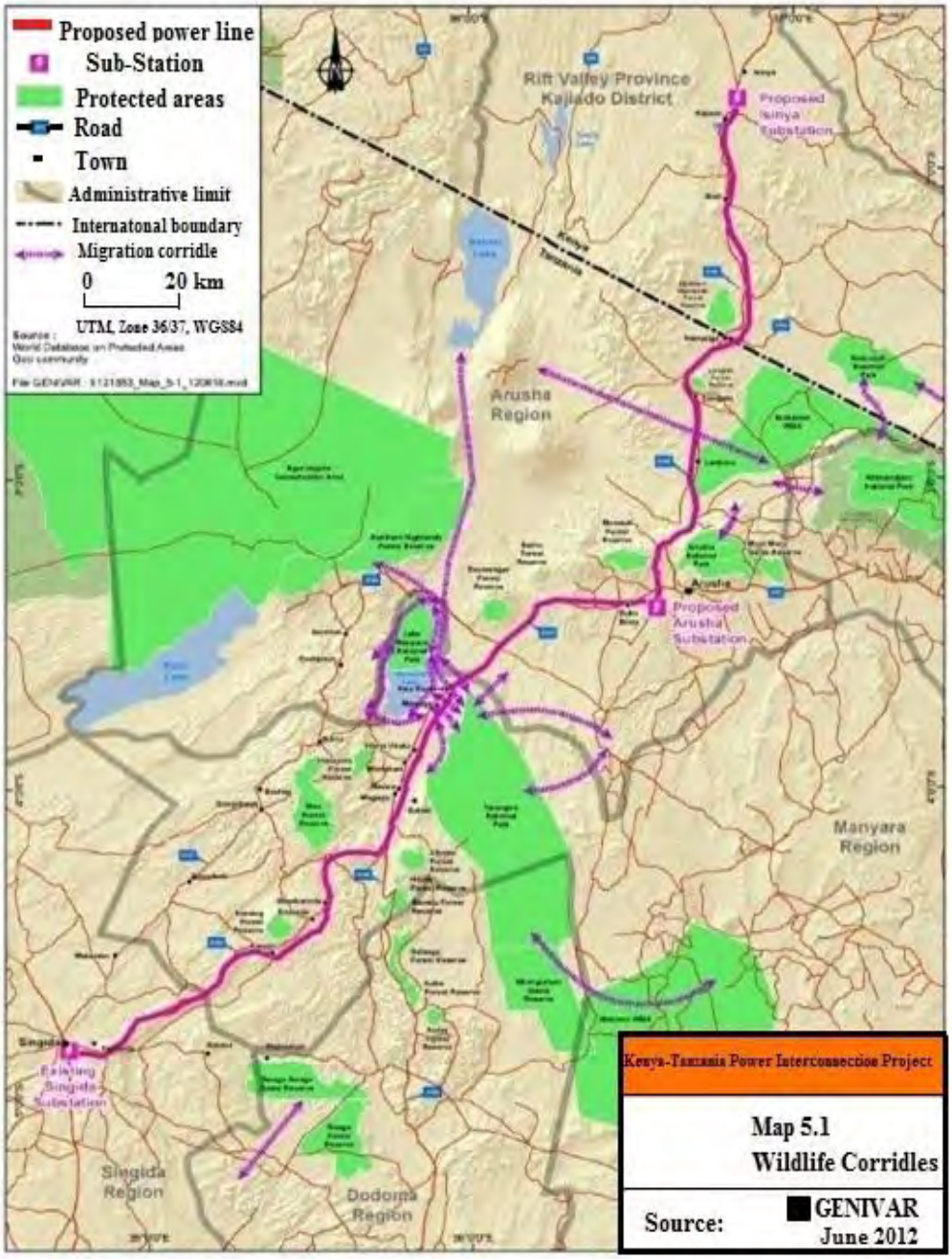
- population dynamics data indicate that the migratory species is maintaining itself on a long term basis as a viable component of its ecosystems;
- the range of the migratory species is neither currently being reduced, nor is likely to be reduced, on a long-term basis;
- there is, and will be in the foreseeable future, sufficient habitat to maintain the population of the migratory species on a long-term basis; and
- the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management;

From the above the 400KV way leave need to have a reliable committed monitoring paradigm, the World Elephant Center in Tanzania have the experience on cross boundary wildlife corridors. Strengthening rather than initiating a new body is prompt in this project for permanence of data collection and disseminations.

Where appropriate and feasible, the proposed World Elephant Center should provide for, but not be limited to:

a) Periodic review of the conservation status of the domestic and cross boundary migratory species concerned and the identification of the factors which may be harmful to that status;
b) Co-ordinate conservation and management plans;
c) Under TAWIRI do Research into the ecology and population dynamics of the migratory species concerned, with special regard to migration and share with their Kenyan counterparts;
d) Collect and provide information on the migratory species concerned, special regard being paid to the exchange of the results of research and of relevant statistics under the auspice of TAWIRI;
e) conservation and, where required and feasible, restoration of the habitats of importance in maintaining a favourable conservation status, and protection of such habitats from disturbances, including strict control of the introduction of, or control of already introduced, exotic species detrimental to the migratory species;
f) Maintenance of a network of suitable habitats appropriately disposed in relation to the migration routes;
g) Where desirable, provision of new habitats favourable to the migratory species or reintroduction of the migratory species into favourable habitats;
h) Elimination/propose mitigation of, to the maximum extent possible, or compensation for activities and obstacles which hinder or impede migration;
i) Prevention, reduction or control of the release into the habitat of the migratory species of substances harmful to that migratory species;
j) Measures based on sound ecological principles to control and manage the taking of the migratory species Conservation of *Depositary's Original* Migratory Species of Wild Animals (CMS). cies;

k) in collaboration with district Council authorities strategies procedures for co-coordinating action to suppress illegal taking;
l) Exchange of information on substantial threats to the migratory species;
m) Share emergency procedures whereby conservation action would be considerably and rapidly strengthened when the conservation status of the migratory species is seriously affected; and Convention on the Conservation of *Depositary's Original* Migratory Species of Wild Animals (CMS).
n) Making the general public aware of the protection of focal species corridors and contents and aims of the convention Agreements.
o) This section presents a summary of current knowledge on wildlife corridors present in the study area. Information on the current status of each migration corridor as well as on wildlife using these corridors is provided hereafter.



Map 3: Wildlife Corridors

4.2.6.1 Description of Wildlife Corridors

There are four wildlife migration corridors crossed by the selected power line corridor (Table 10). These wildlife corridors are all located in Tanzania.

Table 10: Name of the Corridor/ Crossing, target species, geo locations and season the corridor used by respective species

Name corridor	Width	Length	Target species	Locations	Season
Tanganyet (Kikoti Crossing) Corridor	10km (**3km for elephants)**	25k m	**Scientific name** Elephants Giraffes Zebras	Lat 2°46'48.70"S Long .36°42'39.62 Lat 2°51'48.57"S Long 36°42'11.46"E	**Throughout the year**
Mswakini Corridor	2.5 km	5 km	Wildebeest Elephants Giraffes Zebras	3°39'44.44"S 35°58'3.99"E 3°40'18.82"S 35°56'51.49"E	**Throughout the year**
Jangwani Corridor	3.5km	20 to 25 km	Wildebeest Elephants Giraffes Zebras	3°24'31.66"S 35°55'4.91"E 3°25'25.27"S 35°55'54.04"E	**Wet season**
Swaga Swaga – Barang'ida - Gendawari *	5 to 10 km	72km	Wildebeest Elephants	4°41'4.92"S 35°12'37.30"E 4°31'35.20"S 35°16'46.78"E	**Dry season**

Source: World Elephant Centre 2013

Table 11: Wildlife Corridors

Wildlife Corridor	Region	Urgency[1]
Amboseli Kilimanjaro-Lake Natron	Kenya - Kilimanjaro, Arusha	Critical
Manyara Ranch-Lake Natron	Manyara	Moderate
Tarangire-Manyara (Kwakuchinja)	Manyara	Critical

Notes: 1- Extreme = probably less than 2 years remaining; Critical = probably less than 5 years remaining; Moderate = less than 20 years remaining.

Source: Jones *et al.* (2009)

Amboseli- Kilimanjaro-Lake Natron Corridor

The area West of Mount Kilimanjaro supports large numbers of elephants and other wildlife. It serves as an important wildlife corridor between three protected areas, Lake Natron, Kilimanjaro and Amboseli National Park. The selected power line crosses the migration corridor near Longido along road A104. As many as 600 elephants use this zone

in the dry season. The area also provides important calving areas for zebras, wildebeests, Thomson's gazelles (*Gazella thomsonii*), and Grant's gazelles.

Table 12: Estimated wildlife numbers crossing the Arusha – Namanga Road in both Wet and dry season. Data based on direct and indirect observation of respective specie

Species	Wet	Dry	IUCN RED LIST
Elephants	**400**	**200**	**Vulnérable**
Giraffes	1000	1200	n/a
Zebras	1500	1000	n/a
Wildebeest*	2,000	-	n/a

*****

Never recorded wildebeest crossing the road in dry season

Source: World Elephant Centre 2013

Manyara Ranch-Lake Natron Corridor

This wildlife corridor starts at the northern end of Tarangire National Park (TNP) and crosses the selected corridor, and then passes through Manyara Ranch. Wildlife is present on the northeast boundary of Manyara Ranch and continues northwards of the plains, on the southern edge of Lake Natron. Much of the area is composed of open grassland interspersed with patches of bush land. Wildebeests and zebras movement from TNP to Lake Natron has been confirmed by radio collaring and tracking of individual animals. It is likely that giraffes and elands also use this route. The first stage of the corridor, between TNP and Manyara Ranch, is heavily used by elephants, wildebeests and zebras in addition to migration of giraffes, buffalos and elands. The Park is a dry season refuge for migratory herbivores that move West, North, North-East, East and South from the Park at the beginning of the rains in November.

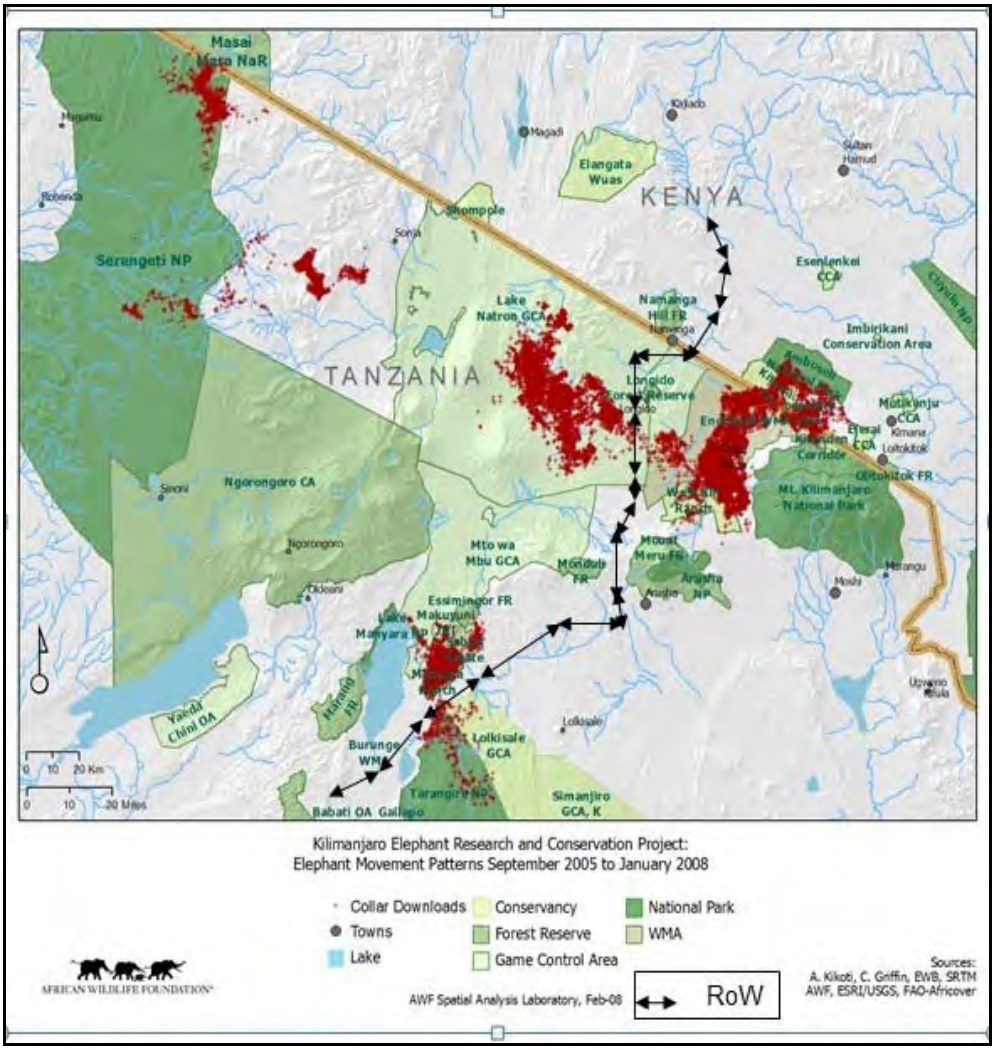
Tarangire-Manyara (Kwakuchinja) Corridor

Known as the Kwakuchinja wildlife corridor, the Tarangire-Manyara corridor lies between Lake Manyara and Tarangire National Park. The selected power line crosses this wildlife corridor. The vegetation is primarily savannah with pockets of woodlands along waterways. Elephants, bushbucks (*Tragelaphus sp.),* impalas and vervet monkeys (*Cercopithecus aethiops*), along with livestock, utilize the corridor throughout the year. Research studies done on the above corridor involving radio collaring will be of

Table 13: Estimate wildlife numbers crossing the Makuyuni Minjingu road in both Wet and dry season, data based on direct and indirect observation of respective species from 2010 to 2012

Spécifs	Wete	Dry	IUCN RED LIST
Éléphants	600	400	Vulnérable
Giraffes	600	200	n/a
Zébras	1500	1000	n/a
Wildebeest	2500	1000	n/a

Source: World Elephant Centre 2013



Map 4: Elephant corridor, dispersal areas and migratory routes (collar radio)

Source: Kilimanjaro Elephant Research and Conservation Project Sept 2005 - Jan 2008

NB. There is correlation between map 3 and 4 above however the above 3 shows a line but describes a range span of corridors as between 29 km and 8 km wide respectively. Map 4 has GPS coordinates used frequently by elephants for two and a half year. The reliable data on map 5.2 are useful specific for the field tower erection

4.2.7 Important Bird areas (IBA's) Wetlands and Birds

The list of Important Bird Areas (IBAs) and Wetlands found along the existing and proposed power lines and surrounding areas with respective type of birds and IUCN status of those birds is given in Table 14 below. the area where the 400KV traverse is within the important avifauna ecological system where an estimate of up to one million flamingo migrates to Lake Natron situated in Enhareareso Ward of Ngorongoro District in Arusha Region; where they lay eggs and bleed successfully. It is estimated that more than three quarters of the world population of

Lesser flamingo lives in East Africa and use the Northern Tanzania shallow lakes inclusive lake Natron, Manyara and associated wetlands. It is estimated that 2.5millon lesser flamingo live in East Africa. Other birds do also leave and migrate crossing the proposed way leave and there reports from the community that collision do happen, with single bird dead, however it's not a significant impact. Prey birds which are invasive owing to finding safe inhabited on the existing 220Kv line include the pie crow. More other crossing Specific areas require close monitoring. The identified areas below should work as a benchmark and not an end.

Table 14: Important bird corridors

S/N	IBA Wetland and Name	Coordinates Locations For	Family/Specie Name	English Name	IUCN
1.	**Longido Game Controlled Area**				
			Falco naumanni		**VU**
			Phoenico pterus minor	Lesser flamingo	**NT**
			Agapomis fischeri	Fischer's lovebird	**NT**
			Parus frigilllinus	Red throated Tit	**NT**
			Baeopogon indicator	Honey Gide Greenbul	
			Ptemistis swainsonii	Yellow necked spur fowl	**BA**
			Charadrius asiaticus	Caspian Plover	**LC**
	Bubu	[36M0782911E, 9533532N]			
	Oloboro Hills	[37M0244805E, 9674555N]	*Thalassornis leuconotus*	White-backed Duck	**LC**
			Ciconia ciconia	White Stock	**LC**
			Leptoptilos crumeniferus	Marabou Stock	**LC**
			Phoenicopterus minor	Lesser Flamingo	**NT**
			Streptopelia capicola Streptopelia	Doves(Ring-necked Dove, Red-eyed Dove)	**LC**
				Egrets	**LC**

				Crows (Pied crows)	**LC**
2	**Lakes**	36M0755342E, 9515910N,			
				Geese	**LC**
				Ducks	**LC**
				Egret	**LC**
			Scopus umbretta	Hamerkop	**LC**
			Phoenicopterus minor	Lesser Flamingo	**NT**
			Streptopelia capicola Streptopelia	Doves(Ring-necked	**LC**
			Corvus albus	Pied crow	**LC**
			Aquila spilogaster	African Hawk Eagle	**LC**
3	**Lake Singida**				
			Phoenicopterus minor	Lesser Flamingo	**NT**
			Phoenicopterus ruber	Greater Flamingo	**LC**
			Anas erythrorhyncha	Red-billed Duck,	**LC**
4	**Lake Kindai**				

			Charadrius asiaticus	Caspian Plover	**LC**
			Sterna nilotica	Gull-Billed Tern	**LC**
			Falco naumanni	Lesser Kestrel	**LC**
5	**Lake Burungi**				
			Phoenicopterus ruber	Greater Flamingo	**LC**
			Phoenicopterus minor	Lesser Flamingo	**NT**
				Avocets	**VU**
			Leptoptilos crumeniferus	Marabou stock	**LC**

NOTE: LC=Least Concerned, NT=Near Threatened, VU=Vulnerable, EN=Endangered, CR=Critically Endangered

4.2.8 Protected Areas

Protected areas in the Arusha region include Arusha National Park, Lake Manyara National Park, Ngorongoro Conservation Area, Mount Meru Game Reserve, Monduli Forest Reserve, Northern Highlands Forest Reserve, Burka Forest Reserve, Longido Forest Reserve and Essiminger Forest Reserve. Other protected areas include the Lake Natron Ramsar site, Lake Natron Game Controlled Area and Enduimet Wildlife Management Area.

Manyara region has two famous national parks, Lake Manyara National Park and a section of Tarangire National Park. The two parks are joined by the Burunge Wildlife Managed Area. The Burunge WMA forms an important wildlife corridor joining the Lake Manyara National Park and Tarangire National Park. These parks are famous for large population of elephants. Game controlled areas are part of protected areas crossed by the transmission line ROW (Map 3) In fact, the power line RoW was difficult to avoid all protected areas.

4.3 Human Environment

The following data were collected during an extensive socioeconomic survey which has been supplemented by reference to secondary sources, including published/unpublished reports as well as existing sources of information such as official documents, information obtained from NGOs, international organizations, meetings at community level: background socio-economic data, socio-educational infrastructure, socio-economic activities, industry and trade, access to drinking water, rural electrification, manpower and services, etc. All information collected during these consultations has been recorded as well as the names of participants (Appendices 2 and ESIA report volume III).

4.3.1 Administrative Framework and Land Tenure

The study area is administered by the Government of Tanzania under the Prime minister's office, local government and regional administration at the highest level: regions, districts, divisions, wards, villages/*mtaa*, and sub-villages at the lower level. Each region is headed by a Regional Commissioner; each district by a District Commissioner; each division by a Divisional Officer; each ward by a ward executive officer and each village by a village executive officer.

There are also local authorities that generally deal with local service provision led by appointed director under the Local Government Regional administration. For example, all development issues at district level are managed by the District Executive Director after the approval of the District Council led by the council chairperson elected among councillors. And thus, the District Council, with its relevant officers, have the mandate to manage and supervise developmental activities under various sectors representing the sector ministries. Some of the services

provided by the local authorities include water and sewerage, health, education which are supported by the Central Government through its Ministries of Water, Health and Education respectively.

Land tenure falls under three categories, namely reserved land (Under the jurisdiction of the Land Commissioner), village land and general land. Reserved land is set aside for wildlife, forests, marine parks, etc., and the way these areas are managed is explained in the laws regarding each sector (*e.g.* Wildlife Conservation Act, National Parks Ordinance, Marine Parks and Reserves Act, etc.). Specific legal regimes govern these lands under the laws used to establish them. Village land includes all land inside the boundaries of registered villages, where the Village Councils and Village Assemblies are given power to manage. The Village Land Act gives the details on how this is to be done. General land is neither reserved land nor village land and is therefore managed by the Commissioner. The Land Act is governing this land.

Due to the agricultural potential of land in parts of Arusha district, Babati and Hanang districts, as well as in parts of Singida (arable land accounts for 70% in districts of the project area, compared with the national average of 42%), the original colonial settlers in some areas where they owned land demanded privatization of land rights in return for investment in the development of the region. However, in large part of the project area, local communities own the land they live on or they cultivate as customarily or with title deed. As an effort to reduce poverty among the communities in some part of the project area, particularly in the Babati district, the customarily land right has being issued to the community and these documents are legally recognized and the owner can use it as bond for loan at any bank.

4.3.2 Demographics Trends

Arusha Region

According to the 2012 population census, the Arusha region had a population of 1,694,310 people, with an average growth rate of 3.5% against the national rate of 2,8%. The population density is low; 16,2 inhab./km^2 compared to the Tanzania mainland average density of 26,2 inhab./km^2. According to the census data, Arumeru and Arusha are the most populated among Arusha's districts.

Manyara Region

According to the 2012 Population and Housing Census General Report, Manyara region had a population of 1425,131 people, with 717,085 males and 708,046 females. In the regional data statistics for 2004, the population is estimated at 1 114 000 people. The most populated district in the Manyara region is Babati, which is also the regional headquarters, followed by Mbulu and Hanang Districts. The availability of arable land for agriculture activities with large plantations of various crops, especially in Mbulu and Hanang Districts, explains their relatively large population.

Nonetheless, Manyara region is one of the least densely populated and one of the least urbanized regions of Tanzania. With an average density of 23 people/km^2 in 2002, only the regions of Lindi (12 people/km^2), Rukwa (17 people/km^2) and Ruvuma (18 people/km^2) are less densely populated. With an urbanization level of 13,6%, the Manyara region is the 6th least urbanized among Mainland regions. The region also has the fourth fastest population growth rate with 3.8%.

Singida Region

According to the 2012 census, the region's population was 1,370,637 people with a growth rate 3.3% and an average number of people by household of 5. The distribution of the population varies within the districts (Table 15), with high concentration of people in Iramba and Singida Rural Districts, where most of the agriculture activities take place. The proposed project will mainly affect Singida Municipal and the district of Singida Rural which, according to the 2002 census, is the most populated district in the Region.

Table 15: Population Data for Project Districts in 2012

District Name	Population
Arusha	323198
Longido	123153
Monduli	158929
Babati	312,392
Hanang	275,990
Singida Municipal	150579
Singida Rural	225521
Total Population	**1569762**

Source: National Census 2012

4.3.3 Gender Issues

In Tanzania, about 60% of women live in poverty. This is a result of the increasing poverty among the rural and urban population generally; the growing gap between the rich and poor, women and men, and among women themselves. In the rural sector and the poor urban suburbs, women carry a heavier burden because, by tradition, women lack property rights and they also lack adequate knowledge on existing credit facilities.

Due to most women low education level, their knowledge and skills on how to manage their work is generally low. Most of women also depend on poor technology, which consume their time and energy. To overcome this situation, the Government of Tanzania committed itself to enhance women's economic capacity through making credit facilities available to a majority of women. Building and supporting women entrepreneurial skill, improving their management capabilities, increase training and access to technology.

The government has also committed itself to establishing legal literacy and education campaigns to enhance awareness of woman's legal and human rights (Tanzania n.d.). The commitment includes teaching human rights in schools and in adult education programs. In addition, the Tanzanian Ministry of Community Development, Gender and Children is planning regional campaigns in cooperation with UNIFEM's "Say NO to Violence against Women" campaign (UN, 27 May 2008). The development of an integrated national response to preventing domestic violence in partnership with the Commission on Human Rights for Good Governance, youth leaders and NGOs has also been proposed as part of the government's National Action Plan (Immigration and Refugee Board of Canada, 2008).

The three regions included in the project area share some similarities in their cultures and economic activities. For the Arusha and Manyara regions, people are mainly livestock keepers and farmers, while in the Singida region, farming is the main economic activity. In such communities, most land is owned by men and therefore women are left with very little security and are second as far as decision making is concerned. In the Maasai communities, most men are polygamous and most of the land and other family's wealth are owned by men. However, there is a growing trend of raising women's awareness in these areas and various NGOs are active in the areas. In Monduli District, for instance, the District provides women with loans to enable them to overcome some of the economic constraints associated with gender. Also in Longido and Babati districts, women have been encouraged to establish women development groups, such as MWEDO, which bring together women to fight against poverty and diseases including HIV/AIDS with support of NGOs such as AFNET.

4.3.4 Vulnerable ethnic Issues

The project area is populated by ethnic groups with varied cultures, languages and religious beliefs. This diversity is more popular in areas that have urban characteristics such as Babati and Singida Municipal as well as in Namanga village, which is at the border of Kenya and Tanzania.

Major ethnic groups include: Mbugwe, Iraqw, Mangati, Nyiramba and Barbaik. There are also minor ethnic groups who are mainly migrants in a particular area. These include Pare, Chaga and Nyisazu. The largest group, in terms of numbers, is the Maasaï (37%) and the Nyaturu (33%). It should however be noted that the Maasaï are found in more districts than the Nyaturu.

The major ethnic groups in Arusha District include: Maasaï, Arusha, Meru, Iraq, Hadzabe and Barbaig. All have unique cultural heritages. The Maasaï are the most influential tribe in the region. The Arusha and Meru people live near Mount Meru. Rwa, Mbulu, Iraqw, Temi. Mbugwe people are also present in a few areas. The city of Arusha is currently undergoing urbanization, which is drawing people of many tribes from all over the country and Swahili has played a unifying role among the ethnic groups.

Manyara region contains Tanzania's most interesting and distinctive vulnerable ethnic groups. The Iraqw of Mbulu and their cousins the Gorrowa of Babati, as well as the Alawa and Burunge of Kondoa, which are a unique group in Tanzania. The only similar ethnic groups are found far away in Ethiopia among the Oromo. The Hadzabe of Yaeda Valley in Mbulu District, who number only about 1 500, are also distinctive as a group as they have the smallest stature in Tanzania. They still live on hunting and the collection of wild honey, wild fruits and roots. The region is also home to Mainland's greatest concentration of the Barbaig, the Ndorobo/Akea and the Maasaï who are historically, the most warlike ethnic groups. Another group, the Akea, is also distinctive. They keep no livestock, and cultivate no crops. Their home is the forest, where they engage in hunting and the gathering of wild honey, wild fruits and roots. The group is disappearing by assimilation from the Maasaï. Currently, they number about only 500 in the Manyara Region. Another 2 500 people from this group can be found in the Arusha Region.

In the Singida region, inhabitants are mostly Nyaturu, Nyiramba and in some areas where it borders Dodoma, Wagogo and Warangi are present. The Nyaturu and Nyiramba tribes are the native people of the region and thus share similar traditions and customs. In general, the tribes live in good harmony and Tanzania has remained relatively peaceful since independence.

4.3.5 Land Use and Economic Activities

4.3.5.1. Namanga Arusha Babati Singida

As for most parts of the country, agriculture is the main economic activity in the project area particularly in Singida, parts of Manyara and Arusha region. In Monduli and Longido Districts and parts of Babati District, most local people are livestock keepers though they also practice agriculture for subsistence use.

There is considerable potential for agriculture development in various parts of the project area. For instance, in the Singida region approximately 1,1 million ha of arable land is still undeveloped. Most farmers in the area use hand hoes, and as a result the farms are small in size. Major food crops grown are maize, sorghum, millet, paddy, cassava, and sweet potatoes while cash crops grown are sunflower, cotton, tobacco, pigeon peas, groundnuts, beans, and onions.

Livestock keeping is also a very important activity (Table 5.4). More than 90% of the livestock population in the country is of indigenous types, kept in the traditional sector, having a characteristically low productivity yet well adapted to the existing harsh environment, including resistance to diseases. The meat is consumed by the household and a little amount is sold, mostly locally. Livestock are kept mainly for cultural reasons and for food security.

Price for land varies between areas and according to land productivity, scarcity and location of the plots. The survey conducted in the project area revealed that the highest price of land is in Hanang District, especially in Katesh, Endasak, followed by Babati District, in Dareda,

Magugu and Arusha, where an acre of productive land is sold at 3 to 5 million TShs/acre; compared to other district where the land value is at one million TSh/acre.

Table 16: Livestock Production

Region	Cattle	Goats	Sheep	Pigs[1]	Indigenous Chicken[1]
Arusha[2]	1 523 238	1 795 227	717 620	58 657	1 593 466
Singida	1 810 098	1 236 046	454 995	6 375	1 643 973

Notes: 1- National Sample Census of Agriculture 2002/2003
2- Includes Arusha and Manyara.

Source: MLD. 2006; 2007

Processing, marketing and consumption of quality meat and meat products is limited by inconsistent supply of quality animals, inadequate market information, inadequate research and training in meat technology, low awareness of consumers on meat quality and lack of capital for investment in meat processing plants.

Agricultural commercial activities, including trading, are still minimal and contribute very little to the regions Gross Domestic Production (GDP). Currently small scale industries, specifically that processing food oil, are mushrooming in the Singida region, mostly in Singida town. In Arusha, there are a growing number of both small and large scale industries manufacturing various products. With reliable electricity, there is possibility of other industries being introduced in the area considering the diversity of raw materials available.

Apart from agriculture, another important land use activity is tourism. The parks and protected areas attract a large number of tourists. For example, in the Arusha and Manyara Regions, there are many national parks (Arusha, Tarangire, Manyara and Ngorongoro Conservation Area). Similarly, wildlife corridors have been designated as wildlife management areas in Enduimet, between Arusha, Kilimanjaro and Lake Natron Game Controlled Areas, and Burunge, between Tarangire and Lake Manyara National Parks.

Although there are numerous resources for tourism activities, such as tourist attractions that include national parks within the project area, relatively few local communities are directly engaged in tourism business. Most local people are only involved in auxiliary activities (*e.g.* driver, guide, housekeeper, etc.) that are directly or indirectly linked to tourism, therefore with a minimum contribution to the overall income of the population in touristic areas (Josaphat *et al.*, 2002).

4.3.6 Infrastructure

Arusha Region

Arusha region, which is about 700 km North-West of Dar es Salaam, is easily accessible by road from various parts of the country. There is a tarmac road that links Arusha and other parts of the country as well as another important Arusha-Namanga road that connects Arusha with other cities of East Africa, including Nairobi and Kampala, via Namanga town.

Currently, the government of Tanzania is upgrading the Namanga-Arusha and Arusha-Babati (A104) road to bitumen standards. This road is also the main route used for tourism in the northern tourist circuit of the country. From Babati, the B143 road to link Babati with Singida and other parts of the Central and north of the country is also being upgraded to bitumen standard.

Other than road infrastructure, Arusha is also a major gate way to various international destinations in and outside Africa and the world in general through the Kilimanjaro international airport and the Arusha airport.

4.3.6.1 Arusha substation and 5km access road

The Arusha substation will be built at Lemugur Village 12 km from Arusha town. The proposed Kisongo substation will be a hub accommodates the 400kV transmission line from Isinya through Namanga and the 400kV TL from Dar es Salaam. An additional environment and social data collection for the substation and access road from the junction of A to Z industrial to Lemugur village, where Kisongo SS will be located was conducted in October 2013 in the essence of identifying possible impacts to the new infrastructures. A land acquisition of 400 X400 meter is required for the substation which will include substation building, transformers, line feeder bays, isolators and busbars, staff houses and fence .It's on a farm land own by the village community 35 people will be affected for reallocation of land acquisition among them 7 will be need resettlement of houses and cattle bomas

The 5km access road is rough eroded passing in black cotton soil, the road need to be upgraded to bitumen to facilitate the transportation of heavy machine to site during construction and ease communication during operation. It was confirmed by Arusha District Council that no land acquisition will be required

Two consultative meetings with communities together with Arusha regional and district council were conducted.

Photo 16: (Top); public meeting ;(Bottom) meeting with affected at Lemugur/Kisongo substation Arusha

Manyara Region

Manyara region is mainly linked to most parts of the country via Arusha. With the current up-grade of the Arusha-Babati-Singida roads, Babati a junction with the western regions, is also crossed by the known great North road from Capetown Nairobi to Cairo, the region will be more accessible with the proposed improvement of the region roads from Dodoma. The other roads within the region mainly fall under the category of district roads and are being improved regularly.

Singida Region

The Singida region is accessible from Dodoma and Dar es Salaam, with a reliable road network and will also be connected with reliable network from Manyara and Arusha once the ongoing construction of the connecting roads into bitumen standard will be completed (September 2011 is the target completion date).

The Singida region is the **hub** of the country power transmission grid. Currently, energy from the national grid to the North zone (Arusha and Kilimanjaro) is going through Singida. The lake zone and the major mining sites of the country are also located in Singida.

The proposed 400 kV line from Iringa to Shinyanga will also go through the Singida region. The current interconnection project, between Kenya (Isinya) and Tanzania will be connected to Singida.

Some Districts in Singida, such as Manyoni, are also connected by the central railway system, to Dodoma and Dar es Salaam in the East and to the Lake zone (Kigoma) to the West.

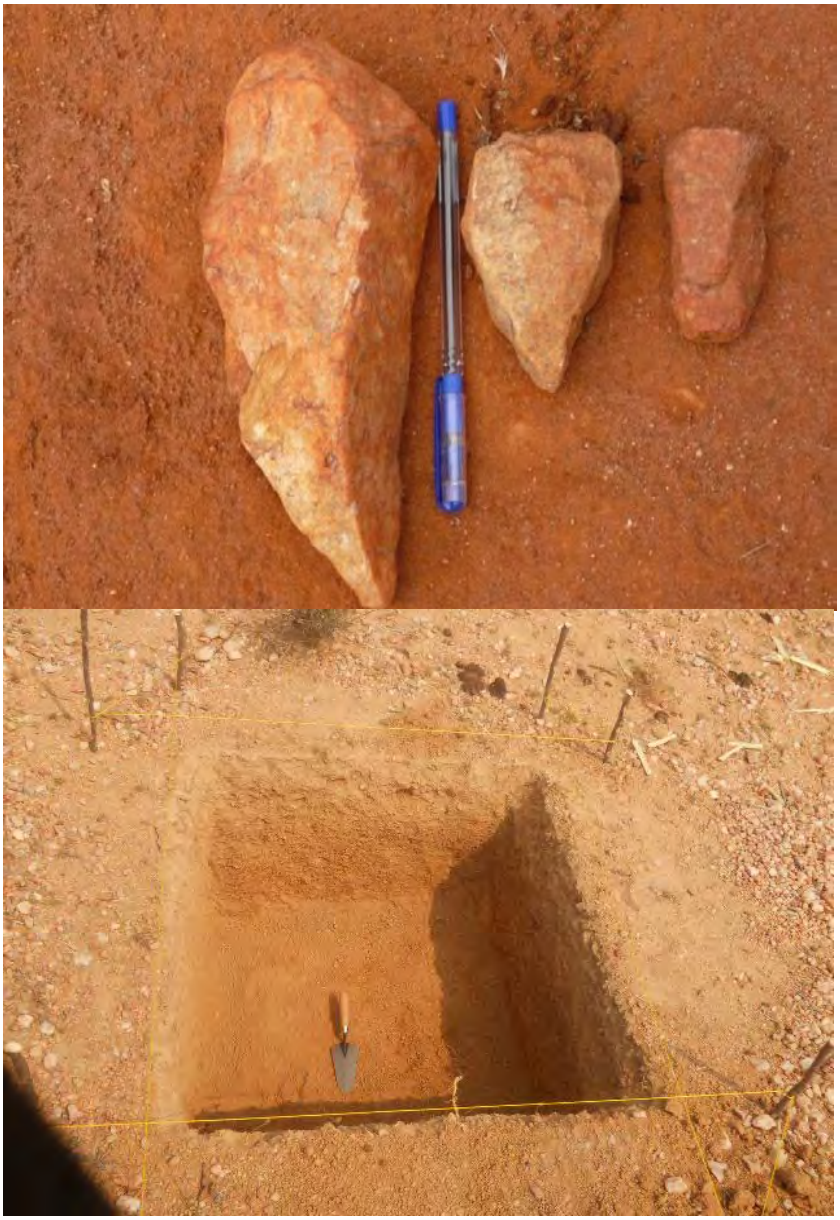
4.3.7 Cultural Heritage and Archaeology

Central Tanzania is very rich in rock painting sites (Leakey, 1983c; Lim, 1992; Masao, 1979). The paintings probably tell more about Stone Age people and their behaviours and culture than can be learned from stone tools, pottery, bones, and other artefacts that form the basis of archaeological studies. Stylistically, the rock art of Tanzania provides one of the longest chronological sequences of artistic creativity in the world, possibly going back in time to about 40 000 bp (Anati, 1986, 1994). If this date is confirmed, it means that Tanzania was one of the earliest centres for the origin and evolution of artistic capability in the world.

Arusha, Manyara, and Singida regions, which are partly located in Central Tanzania, are a warehouse of heritage resources, which document the origin and development of humanity.

At Mungumaji site, a systematic survey was conducted by a professional archaeologist from the University of Dar es Salaam to characterise the site's extent and layout, studying the distribution of the remaining features and recording and collecting the artefacts from the surface. Both surface survey and excavations recovered Middle Stone Age (MSA) artifacts. At Endagaw village, because of the nature of the area, unsystematic survey was conducted. The cultural materials found were also MSA artifacts. The MSA occurrences range in age from 300 000 to 35 000 years ago (Clark 1988; McBrearty and Brooks 2000; Willoughby 2007). Most of these materials were found underground; no surface structure except for grave yards had an archaeological significance (Photo 5.4). Some of these artifacts were deposited at the University of Dar es Salaam.

Photo 17 Archaeological findings and excavation



There are also some cultural properties belonging to communities and individuals, such as graves and graveyards, located within the ROW of the proposed power transmission line. Through village meetings and surveys, it was noted that these cultural heritage properties including those that have not already been detected may be impacted by the project.

Consultation with local communities also revealed that there are other physical cultural heritages such as sacred areas, landscape and mountains where traditional rites or ceremonies are performed and sanctified trees which are attached to intangible heritages in the proposed way leave. According to current regulation there should be some form of compensation payment for loss of these sites, if the loss cannot be shunned. In additional, local communities asserts that will be crossed by the line includes bushes and forests, which may have their totemic animals for example; python for the Barbaig ethnic group.

At this stage a precise identification of where and how many such sites of cultural significant lie within the way leave cannot be exactly ascertain. Although a tentative figure has been provided in this ESIA report, a keen complete appraisal is a processes that should take into board the relevant authorities to be involved at all stages.

Another project located in the vicinity of the wayleave is the multinational Arusha – Namanga – Athi River road construction and upgrading project. This project was approved by the African Development Bank (AfDB) in 2007 with co-financing from the Japanese International Cooperation Agency (JICA). The Arusha – Namanga – Athi River Road Development Project consists in the construction of 242 km road crossing the Kenya – Tanzania border at Namanga, with 136 km in Kenya and 106 km in Tanzania. Construction work commenced in November 2007 on the Kenya side and in July 2009 on the Tanzania side. Construction of the road is expected to be completed by 2011. During preparation of the Arusha-Namanga-Athi River project, provisions were made for the construction of a One-Stop-Border-Post (OSBP) at Namanga. The One-Stop-Border-Post is now at the detailed design stage, construction has not yet begun.

4.3.7.1 National development policies

Regional and rural development policies in the country have done significant work to reduce poverty and initiate developmental activities in the region.

There are a number of development activities that are coordinated by the local government such as district council, by non-governmental agents and organizations. Much of these activities are related to the poverty alleviation strategy, which takes into account the local community participation in all developmental projects.

The establishment of wildlife management areas are examples that intend to benefit the communities through conservation and utilization of wildlife resources. For example, the Burunge and Enduimet Wildlife Management Areas recently received funds from the World Wildlife Fund (WWF) to implement infrastructural development to improve income and revenues from tourism activities and increase benefits to the surrounding communities.

Other developmental activities in the area include road construction to upgrade the Arusha – Singida via Babati and Kondoa, Namanga – Arusha roads to bitumen standard. These projects will open up the area and accelerate the pace of economic activities in the region. It will also facilitate the transportation of construction materials for the proposed power line.

All district councils have a mandate to invest significant amount of money for development projects. Integrated projects are focused on education, health, water and sanitation, improved livelihoods, environmental conservation, human rights and gender equality. They are implemented by various government agencies, NGOs and CBOs such as: Ministry of tourism, TANROAD, Ministry of livestock, Ministry of water and Irrigation

schemes, Ministry of Natural Resources and Tourism, TANAPA, AMREF, USAID, AWF, NCA and missionaries.

Communities Crossed by the Wayleave

4.4.1 Project wayleave

In Tanzania, the study covers three regions: Arusha, Manyara and Singida. The districts crossed by the transmission line corridor are Arumeru, Longido, Arusha, Monduli, Babati, Hanang, Singida Municipal and Singida Rural (Table 17 and Appendix 1). Within these districts, the project cuts across 53 villages. The total population of the villages/sub-locations crossed by way-leave is estimated at 82 500 or 5% of the districts population.

Table 17: List of Districts and Villages/Sub-Locations crossed by the Transmission Line

District	Villages/Sub-Locations
Arumeru	Losikito
Longido	Namanga, Eworendeke, Kimokuwa
Arusha	Engurutoto, Lemongo, Longijara, Ngorubob, Olodonyowasi
Monduli	Mbuyuni, Meserani, Mti Mmoja, Luosimingori, Nangwa
Babati	Arri, Dareda Kati, Endasaro, Kiongozi, Mawemairo, Sigino, Mwada, Sarame, Olasiti, Gajal, Vilima Vitatu, Minjinau, Sangaine, Matufa, Sangawe, Sokono, Sangaiwe
Hanang	Getasang, Dumbeta, Endasago, Mingenyi, Measkeron, Mogitu, Nangwa, Masakta, Mara, Masgaroda, Gehandu, Ifendasara
Singida Rural	Kinyamwenda, Itaja Mughamo
Singida Municipal	Singida, Misuna, Kisasida, Msikii, Mungu Mji

4.4.2 Community Services and Buildings

In Tanzania, there are a number of social service facilities in the communities where the proposed line route passes and these include; schools (primary and secondary), dispensaries, markets and administrative buildings, numerous churches and mosques, machinery and production centres (Table 5.8). Most of these facilities are not adequately connected to the electricity grid as they are located in rural areas. Facilities that are connected to the power grid are secondary schools located in town centres, production centres like milling machines, churches and mosques. Facilities found in the project area are communally used and therefore provide centres of socio-economic development.

Table 18: Prevalence of Infrastructure in the Communities, Tanzania

Infrastructure		Prevalence within the communities (in %)	Infrastructures with electricity (in %)
School	Primary	88	8
	Secondary	38	14
	Tertiary	2	2
	Total schools	128	24
Health centre	Dispensary	32	9
	Hospital	3	3
	Total health centres	35	12
Market		26	0
Administrative building		66	16
Religious site	Church	299	22
	Mosque	92	17
	Other religious site	2	0
	Total religious sites	393	39
	Heritage or Cultural site/ cemetery	35	1
Machinery and production centre	Total machinery and production centre, Bricks making	195	90

4.4.3 Manpower and Services

There are several workforce and services available in the communities from which the project will conscript men and women as service providers during the construction of the proposed transmission line route (Table 19). These services are available in many communities along the ROW. The most common trade is masons (builders), with 977 people within the communities, followed by truck drivers (680), carpenters (606) and painters (510). Other available workforce includes mechanics, electricians, welders, heavy machine operators. Some services required for the construction are especially available in the communities located in urban areas. Some other services required are also available as a result of on-going construction activities in the area, such as the construction of the Singida-Babati and Babati-Minjingu roads. The most common available services include construction materials such as sand and gravel, guest houses and mechanical services (dealers, repairs, etc.), transportation of goods or materials, canteen and restaurant, heavy machinery (crane, bulldozer, excavator, etc.) as well as gas and petroleum products. However, the effectiveness, efficiency and reliability of these services are unknown. Moreover, the competence cards were not requested while completing the questionnaire. The contractor will thus have to do the investigation and assessment of services and workforce to ensure that the required services or skills are available before soliciting for workforce and services from outside these communities in the project area.

Table 19: Workforce and services

Group	Type	Number of persons
Workforce	Iron worker / Experience pylon assembler	25
	Carpenter	606
	Welder	213
	Electrician	172
	Truck drivers	680
	Heavy machinery operator	154
	Mechanic	255
	Mason (builder)	977
	Painter	510
	Chainsaw operator	198
	Other (guides, pit constructor, surveyor, tailoring, etc.)	118

Group	Type	Number of persons
Services	Transport of goods or materials (trucks / lorry)	121
	Mechanical (dealers, repairs, etc.)	55
	Gas / Petroleum products (sales, storage, etc.)	30
	Heavy machinery (crane, bulldozer, excavator, etc.)	39
	Materials (wood, stone, sand, etc.)	107
	Canteens / Restaurant / Kiosk	490
	Hotel / Lodge/Guest house	115
	Lumber (wood) Timber company	14
	Bank / Mpesa	28
	Post Office	2
	Security company	2 091
	Other (ranger)	85

4.4.4 Energy Sources Used for Different Purposes and Interest for Electricity

4.4.4.1 Energy demand

In terms of connection to the National Grid and rural electrification, all the districts that will be affected by the project have electricity at the District headquarters, with Longido District obtaining electricity from Namanga-Kenya. At Singida, Manyara and Arusha, which are region headquarters, there are substations that receive and transmit electricity within various parts of the region and elsewhere. It was revealed that most of the villages that are close to the Districts headquarters are connected to the national grid, leaving those away without electricity. Most villages in Longido, for instance, are not connected considering that Longido is a new district and is currently relying on Kenya as a source of power. In villages that are connected to electricity, such as Magara in Babati, Misuna in Singida, it was also revealed that most community services, such as schools, that are government owned are not connected to electricity. In these villages, electricity was only found along the main road.

In villages that have had electricity for many years, such as Dareda, one can see the level of businesses and improved social services being higher than those without rural electrification like Getasang in Hanang District.

In various parts of the country, there are ongoing rural electrification projects under the Rural Electrification Agency. In the project area, such projects were observed in Singida, Arusha and Longido districts.

During community consultation meetings, it was clear that demand for electricity was high. The communities were convinced that availability of electricity would stimulate economic activities, especially in trades such as metal welding, carpenters' wood grooving machines, water pumping, motor-vehicle, mobile phone battery charging, etc., and also enable them to have lighting in households and schools as well as for watching television.

4.5 Characteristics of the Households Affected by the Wayleave

An extensive socioeconomic household survey was done along the ROW in Tanzania. In Tanzania, the survey was also conducted in July 2011 and October 2013 for the Arusha substation and joining 5km access road to the proposed substation. In total, 572 households were interviewed, that is 525 households that will be affected by the wayleave and 19 households that were part of the control group.

4.5.1 Impacted households

Half of the members in impacted households are older than 18 years old; the other half being under the age of 18. In total, 40% of the population in the wayleave is represented by people between 5 and 17 years of age (Figure 2). Finally, 53% of the population is male.

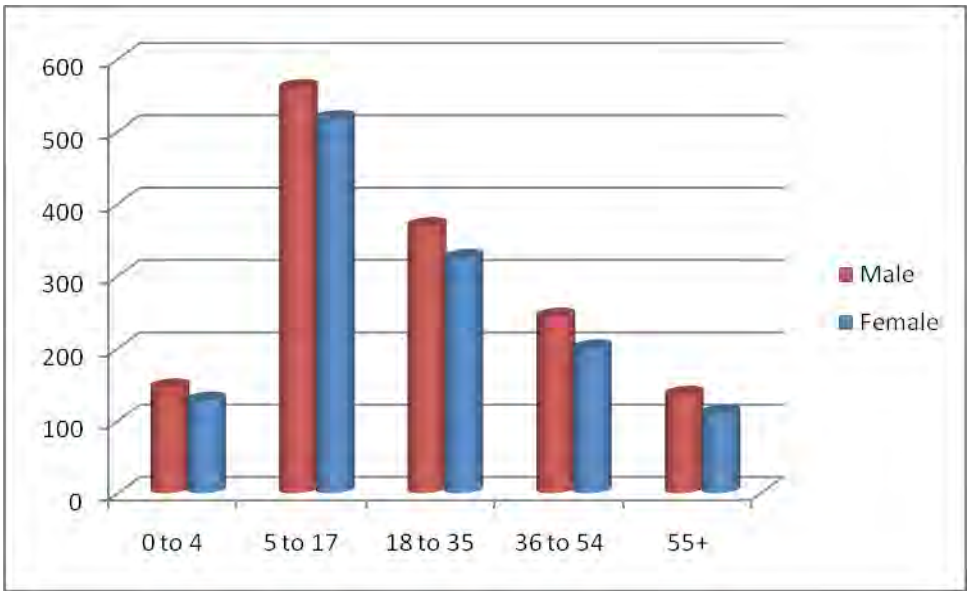


Figure 2: Age distribution in impacted households

4.5.2 Head of Household Characteristics

Results from the survey indicate that men dominate (87%) among the numbers of affected persons and in decision making process. It is therefore important to affirmatively consult and ensure participation of women (13%) throughout the project.

As indicated from Table 20, the project area is populated by ethnic groups with varied semi-cultures, languages and religious beliefs. The

major ethnic groups include Nyaturu and Iraq, with 45 and 19 % of impacted household respectively.

Table 20: Head of Households Characteristics

Characteristics	Impacted household	Control group
Gender and average age of the head of households		
Male	87%	90%
Female	13%	10%
Average age of males	48	47
Average age of females	55	63
Average age	49	49
Ethnic group of the head of households		
Nyaturu	45%	16%
Iraq	19%	11%
Maasai	9%	21%
Muarusha	4%	-
Nyiramba	2%	-
Barbaig	2%	5%
Mbugwe	4%	26%
Other ethnic groups	15%	21%

Education levels in the project area are more or less similar to the Tanzanian standards and to the education level recorded in rural areas. The highest education level attained by 84% of the PAP household heads is primary school, followed by 10% who have no education. Only 1 and 0,2% have attended college or university respectively (Table 21).

Table 21: Education Level of Head of Household, Tanzania

Characteristics	Impacted household %	Control group %
Highest level of education attained		
No education	10	5
Primary	84	74
Secondary	4	5
College	1	11
University	0.2	5

Educational patterns for household members are similar, with a small tendency for PAPs household heads to have somewhat more education than their household members. For household members, the number of people with no education is however lower mainly because of change in government policies that made primary education mandatory.

4.5.3 Women, Children and Disabled Headed Household

The survey identified 53 PAPs who have a vulnerable status. The most vulnerable groups are disabled persons (sick and handicapped) (32%), elderly (28%), widows (9%) and orphans (9%). Finally, 21% have not mentioned why they were considered vulnerable. Others though are categorised as elders but were considered vulnerable on the basis of their level of education/understanding issues pertaining to relocation. It should be noted that the survey did not identify any concentration of vulnerable households along the ROW.

In most districts, it is possible to find women headed households. From this particular socioeconomic survey, it is estimated that 13% households in the wayleave were headed by a woman, of which most are widows (57%). This small number of women head of household is due to the cultural arrangement of the common ethnic groups in the project area, where women rarely own land.

In the project area, there is only one household headed by a person under 18 years of age. The head of this household is a young man who is 17 years old.

4.5.4 Households Revenues

The annual income of households comes from various economic activities (agricultural product sale, salary and business activity, etc.). The level of income of all members of a household varies considerably from one community to another. The variation is determined by type of

activity, location and size of activity. For instance, those combining more than one activity, such as agriculture and paid work, will have a higher income as well as those with large farms and growing cash crops which will have relatively higher incomes compared to those with only one economic activity and at a smaller scale. The minimum annual income is 100 000 TShs (61 USD) and the maximum is 35 000 000 TShs (21 350 USD).

There are 312 affected households (61%) considered as economically vulnerable since their revenue is inferior to TShs 2 828 750/a[2]. In fact, a household is considered economically vulnerable when it spends less than TShs 1 550 per person, per day.

The survey conducted did not identify any concentration of vulnerable households along the ROW in Tanzania.

4.5.5 Households Production: Commercial and Subsistence Agriculture

4.5.5.1 Commercial and Subsistence farming

The majority of the people in the project area are involved in the following occupations; farming of food and cash crops, livestock keeping, business and civil services (Table 22). Except for the sector in Singida Municipal, the transmission line will be mostly located in rural areas were agriculture is the major economic activity (Photo 16). Survey data revealed that 49% of the total population are farmers or stockbreeders and 23% are pastoralists. It was also revealed that most of the population had more than one occupation as they practiced agriculture along with another occupation, such as civil servants and business. Civil servants are mainly in urban areas of Singida, Babati and in the peripheries of Arusha districts. As for fishing activities that were mentioned, they take place in the major wetlands crossed by the proposed transmission line, such as those of Babati and Hanang districts.

[2] Based on the following calculation: 5 members on average in affected households X TShs 1 550 X 365 days.

Photo 18: Common Mixed Farming Practice (Peas and harvested maize farm)

In the study area, agriculture and livestock farming constitute the bulk of occupation for the residents whose land is crossed by the wayleave. Agriculture activities are mainly subsistence and cash crops, such as sunflower, peas, and maize. Livestock farming consists mainly of cattle, goats and chicken with a variation in number. For instance, Maasaï have more cattle while the Nyaturu have more chicken.

Table 22 Population Distribution per Occupation

Occupation	%
Farmer / Stockbreeder	49
Pastoralist	23
Businessman	10
Civil servant	4
Workman / Craftsman	2
Hunter / Fisherman	1
Other	12

Source: Community Survey

CHAPTER FIVE

5.0 ENVIRONMENTAL AND SOCIAL IMPACTS

The project will require construction works over a total length of about 415 km, a new 400kV transmission line will be erected to link Isinya via Namanga to Kisongo (Arusha) substations and Arusha to Singida substations. Construction of 400kV TL will involve vegetation clearance, excavation of foundation for towers construction, erection of towers, stringing of conductors as well as substation construction. Also, the maintenance and repair activities of the ROW and transmission line will involve periodic access to the structures.

5.1 Negative Impacts

The main impacts on the biophysical environment are the permanent loss of vegetation (trees, shrubs and plantations) in the ROW, Kisongo (Arusha) substation, upgrading of 5km road and the permanent loss of small portions of wetlands required for the construction of towers. Other impacts may occur during construction and maintenance works but will be of temporary nature. These include dust emissions, noise, soil erosion, degradation of water quality, soil contamination by poor waste management or accidental spill of hydrocarbons, as well as disturbance and displacement of wildlife.

For project affected households and communities, negative impacts occurring during the construction phase will be localised and of a short-term duration. The main long-term impacts are the permanent loss of arable land due to the presence of access roads and tower bases, and the restriction of planting species without the potential to grow beyond 5 m at maturity in the ROW. In addition to these impacts on agricultural activities, an important impact will be the relocation of houses and some public or private infrastructure such as schools, mosques, churches, shops, etc. In most cases, these will be relocated on another part of the same land, to an adjacent land plot or elsewhere as may be desired by the affected households.

The main sources of potential negative impacts are:

- Displacement of houses, structures, public infrastructure, schools, etc. (loss of time, perturbation of daily life organization);
- Clearance of access roads and upgrading the 5km road to the Arusha substation (crop damage, loss of habitats, disturbance of wildlife);
- Clearance of line corridor between towers (crop damage, removal of trees and of some structures, loss of habitats, disturbance of wildlife);
- Earth-moving and tower construction (crop damage, removal of trees, siltation and contamination of surface water, loss of habitats, disturbance of wildlife);

- Presence of migrant workers in rural areas (health concerns such as HIV/AIDS, social disturbances, overexploitation of local resources such as water, fire wood and other natural resources);
- Construction of work camps (crop damage, modification to water resources and properties, potential affects from inadequate waste management facilities, loss of habitats, disturbance of wildlife, etc.).

Presence of new invasive habiting prey birds e.g. black kite ***(Milvus migrans); Pied crow(Corvus splendens*** in towers invading domesticated chickens and disturbing women income generating activity due to loss of chicken to sale and earn petty cash.

Potential negative impacts of the new transmission line on communities or persons, and on private or common property assets can be prevented or minimised by an adequate preparation and support of alternative income generating activities or improvement of local keeping of chickens . When identified at an early stage, potential impacts can be taken into account in the project design or appropriate mitigation measures can be devised. Elaboration and implementation of adequate programs for compensation and resettlement, as presented in the separate RAP report, will also minimise potential impacts on social and environmental components.

It should however be noted that the adverse impacts of the project will be lessened by the fact that between Arusha and Singida, in Tanzania, 69% of the transmission line route (207 out of 301 km) will be constructed close to an existing 220 kV line. On this portion of the transmission line, the width of the corridor will thus be reduced from 90 m to 70 m.

5.2 Positive Impacts

5.2.1 Overall Positive Impacts for Kenya and Tanzania

The purpose of this interconnection project is to maximise energy flow between the two countries, therefore optimising the economic and environmental advantages of the investments in energy production.

According to the feasibility study (RSWI, 2012), the Hydro secondary energy (Average Energy minus Firm Energy) of the Tanzania generation system can be valued by exporting it to Kenya. Another benefit is that some of the planned generating plants will no longer need to be constructed. In addition, there will be a lessening of the reserved power requirements due to the line.

In Kenya, RSWI (2012) have calculated that an economic gain is foreseen since the cost of new generating plants are higher than importation. It is also noted that, if the interconnection is not constructed, the electricity imports for the 2014-2031 period would be replaced by a combination of geothermal and coal fired power plants in almost equal proportions. These plants would generate GHG; especially the coal fired plants, and thus affects the GHG emission balance sheet of the country.

It is thus clear that the project could have economic and environmental gains for both countries. In addition to these gains, the improved

availability of electricity would reduce power shortages and improve quality of life (less interruption of services, less private diesel power plant pollution, *etc*) of the population, especially in major towns including Nairobi, Arusha and the developing towns of Babati and Singida.

5.2.2 Direct Positive Impacts

While major attention will focus on loss of income due to temporary disturbance to fields chicken keeping or grazing areas, and on health conditions related to the influx of foreign workers, positive opportunities to PAPs and communities may be presented in the form of temporary employment and support on alternative income generating activities mainly during the construction phase but also during maintenance and decommissioning activities.

One of the challenges faced by communities along the Isinya – Singida transmission line is the lack of employment. It is expected that some jobs will be available during the construction of the transmission line, as well as during maintenance and decommissioning activities, for the local population to be employed mainly as casual labourers. According to the community consultations, skills available include driving, lumbering, masonry, carpentry, etc. However, the employment opportunities will be temporary and the community will only benefit in the short run. Jobs will also be limited because less than 100 people will be expected to work on the line at any given time. Therefore, there will be a minimal positive impact on employment as only a few people are likely to be employed. Nonetheless, TANESCO should encourage local leaders to form a project liaison group with the support of the Project Implementation Unit (PIU) to assist them in distributing jobs to local communities along the entire project length.

Women should also benefit from employment opportunities. A gender hiring policy implemented for construction, operation and decommissioning activities will maximise positive impacts for them. The priority will be given to women for jobs related to cooking and cleaning services at worker camps.

Skilled workforce as well as professional and administrative personnel will most likely come from outside the project area, and this may cause some resentment from the local people[3]. Nevertheless, these workers will bring within the project area the much needed additional money to spend.

Positive opportunities to PAPs and communities may also come from income generated by business opportunities during the construction, operation and maintenance phases, such as sale of food and other

[3] From experience, the Contractor may bring his own staff from Nairobi, Dar Es Salaam or Arusha. The locals expect that most of the workers would be from their locality but a certain minimum experience and skills may be required on site.

consumables to migrant workers among others. Women may particularly benefit from these business opportunities.

Another positive impact would be the improvement of existing access roads for construction needs. If these roads are well maintained during construction and delivered in a good state at the end, the communities along the transmission line might benefit from a better road network.

5.2.3 Indirect Positive Impacts

Rural Electrification

One of the most anticipated positive impact by the population is the increased power supply to the communities and households. If the electrification of the areas crossed by the way-leave does go ahead, many significant long-term positive impacts can occur.

For example, several trading centres and community institutions including those at the Arusha substation and others located along the transmission line route do not have access to electricity. These include health centres, educational institutions (primary, secondary and vocational schools), markets, and trading centres as well as village offices or administration offices. The communities request that from this line several step-down transformers be put in different locations to enable households and community buildings access to power supply. With power supply, the community and district leaders believe that these communities' institutions and trading centres will improve services, increase economic activities and accelerate development in their areas of jurisdiction.

In the technical feasibility study (RSWI, 2012), the possibilities of electrifying unconnected communities have been studied. Single Wire Earth Return (SWER) technology can be used to supply electricity to areas remote from the grid. According to RSWI (2012), two SWER can be constructed. The first line goes along the national road A143 from Babati substation to Katesh. The communities between Babati and Katesh would then be connected by this line. The second line would connect Singida substation to Endesh; connecting again the communities located between these two points.

The positive impacts resulting from rural electrification are however dependent on the lowering of the price for connection and cost of electricity which are currently very high and thus not affordable for poor households in rural and urban areas.

Poverty Reduction

Rural electrification lies at the centre of poverty-reduction programs in both Kenya and Tanzania, and would support rural economic development through the provision of power to generate water pumps and develop tourism as well as local industries.

Gender Empowerment

Local electrification would have a significant impact with regard to women's work burden as pumped water and electricity would spare them the arduous daily responsibilities of collecting water and fire wood. The availability of electricity would also help girls' school attendance due to reduction of house workload and eventually allowing them access to better jobs. It can be expected that women will receive better services from health centres given the availability of electricity, refrigeration for medicines and vaccines. Finally, this would have a significant impact on the environment, which is widely threatened by deforestation and soil erosion.

Education and Health

Electricity would support overall investment in education and strengthen the on-going effort of capacity building to overcome critical constraints in the implementation of development programs. Essential to this effort would be power supply to health facilities for the installation of cold storage facilities for the safe transportation and storage of vaccines and other vital medications.

Improved Agricultural Storage and Processing

If improved availability and reliability of power in the area results in a better access to electricity for communities and households, it can improve storage and processing of agricultural products, thus increasing their market value or extending their selling period. Storage using refrigerators will preserve meat, milk products, fruits and vegetables which can be sold or consumed the following days. These improvements could result, on the long-term, in better prices for agricultural products and increased incomes for farmers.

5.3 Methodology

This section addresses and describes the potential impacts of the Project. The environmental and social impacts of the Arusha substation,5km access road to the station, the installation of the power transmission line assessed using data collected from field investigations carried out between May and July 2011, meetings with government offices, review of documents, and consultations with various stakeholders and project affected persons (PAPs).

The identification of the positive and negative impacts of the Project, their level of significance, whether they are long-term or short-term, direct or indirect, avoidable or unavoidable, reversible or irreversible and their classification into pre-construction, construction, operation and decommissioning phases have been based on the following:

- African Development Bank, October 2003. Integrated Environmental and Social Impact Assessment Guidelines;
- World Bank Environmental Assessment Sourcebook and updates (World Bank 1994);

- World Bank Operational Policies/Directives, namely: OP 4.01 Environmental Assessment, OP 4.04 Natural Habitats, OP 4.36 Forests, OP 4.11 Physical Cultural Resources, OP 4.10 Indigenous Peoples, OP 4.12 Involuntary Resettlement, OP 17.50 Public Disclosure (Chapter 3);
- National Environment Management Authority (NEMA) Kenya: EMCA Part VI;
- Tanzania Environmental Management Act, 2004;
- Consultation with PAPs; officials from relevant ministries and government agencies (national, regional and local); village committees and, NGOs/CBOs (Chapters 4 and 5);
- Extensive survey (2011) of communities and households directly affected by the way-leave to determine, in particular, activities and structures present in the future way-leave;
- Mitigation measures, which are presented in the Environmental and Social Management Plan (Chapter 7).

The nature and/or importance of the impacts described hereafter may change in the future should the Project not be implemented within the next two years. It is probable that environmental and socioeconomic changes could occur in the Project area for different reasons (*e.g.* new projects, population displacement, changes in the economic situation or environmental conditions, etc.). Should this be the case, an update of this study will be required.

5.3.1 Assessment of Impact Significance

Criteria used in this study for assessing impact significance are extent, duration and intensity. Three levels of significance are used: minor, medium or major. The more an impact is extended, durable or intense, the greater its significance.

The extent of the impact of a transmission line may be measured in many ways depending on the type of impact, the most frequent being by surface areas and distance. The extent of the impact could be punctual, local or regional according to the portion of area or total length that is subject to modification.

With regards to impact duration, the construction of a transmission line implies long-term and short-term impacts. Long-term impacts may occur as long as the line is in place, such as restrictions for land use and aesthetic impacts. Short-term impacts occur during the construction or at less frequent intervals, such as during the line's repair or maintenance of vegetation in the ROW. Short-term impacts during construction include, for instance, noise and dust. The assessment of an impact's significance also depends on intensity, which is measured based on the extent of modifications observed on the component affected by a project's activity. The intensity of an impact may be low, medium or high. For a physical component, intensity of modification refers to the level of disturbance caused by the project; while for biological components, it additionally refers to specialists' judgement value that takes into consideration the

ecological and social context of the relevant environment and the component's improvement. That assessment may not only help restore acceptability levels, but also determine criteria for impact mitigation or needs in terms of surveillance and monitoring.

That judgment value is based on the consideration of several elements, among which:-

- Existence of a legal or other protection status;
- Social, cultural, economic and aesthetic improvement attributed to the component by the concerned public, such as expressed during consultations;
- Concern level in relation to conservation or protection of the component;
- Current state of component in the study area and existing level of disturbance;
- Abundance of distribution of a species and its habitat in the study area, which implies the features of uniqueness, rarity, diversity, etc.;
- Tolerance of the component vis-à-vis the habitat's physical modifications. For wildlife components, that implies consideration of their ecological requirements (sensitive species or not) and their resilience (capacity to re-establish following a change in the environment);
- Ecosystem-based function of the component *i.e.* its role in the food chain.

The significance of an impact is therefore the result of an overall judgment on the effect of a project activity on a component of the receiving environment; a judgment which is based on specific criteria while also put in context by specialists in the field.

For negative impacts, mitigation or compensation measures are proposed in order to prevent or mitigate the significance of those impacts. For each negative impact, whatever its significance, actions and intervention modalities are proposed to reduce the feared extent, duration or even intensity, when it is feasible. In some instances the mitigation measures (ex. awareness raising and communication activities) must be put in place prior to the construction phase. All the proposed mitigation or compensation measures are presented in Table 27 of the ESMP (Chapter 6). Finally, some enhancement measures are proposed to strengthen certain positive impacts.

The assessment grid of impact significance used in this study is presented in Table 23.

Table 23: Assessment Grid of Impact Significance

Intensity	Determination of Disturbance Level Extent		
	Punctual	Local	Regional
Low	1	1	2
Medium	1	2	3
High	2	2	3
Value of Element	**Determination of Impact Significance** **Disturbance Level** **1**	**2**	**3**
Biological and human environment – Short-term (less than 5 years)			
Low	Minor	Minor	Minor
Medium	Minor	Medium	Medium
High	Minor	Medium	Major
Biological and human environment – Long-term (more than 5 years)			
Low	Minor	Minor	Minor
Medium	Minor	Medium	Major
High	Medium	Major	Major
Physical environment (1)			
Short-term	Minor	Minor	Medium
Long-term	Medium	Major	Major

Note (1): No relative value is given to components of the physical environment. Impacts on those components are only assessed on basis of their extent, intensity and duration.

5.3.2 Source of Impacts

Manpower

Construction works for a high voltage line will require several teams of workers with various expertise:

- After clearing the line's ROW, a team of surveyors sets the location and materializes the four legs of each tower;
- A team of civil engineers follows to carry out excavation of tower bases and install, regulate and pour concrete for bases (generally four feet) of towers;
- A team responsible of establishing the tower structure intervenes with a variable output, generally 1 to 5 towers a day;

- A team of wire and cable pullers continues the cable installation;
- A team is then dedicated to clean-up and rehabilitation of work sites.

Although most of the work is done manually (tree cutting, excavation, equipment transportation, etc.), machinery may be used on site. Those are overhead shovels, trucks and power jib cranes. All works will be limited to the nominal ROW, access roads and camp sites and are carried out during daytime.

Work

During the pre-construction and construction phases, sources of impact on the environment and their consequences include, among others:

- Construction of roads to access work sites: encroachment in wetlands, habitat fragmentation, natural vegetation and crop damages, disturbance and displacement of wildlife;
- Clearing of the line's ROW 90 m and access roads, including tree cutting and waste management: natural vegetation and crop damages, loss of vegetation and structures (private and public buildings), disturbance and displacement of wildlife;
- Displacement of houses, structures, public infrastructure, etc.: loss of time and revenues, perturbation of daily life organization;
- Construction and management of site installations, including construction of camp site: water and soil pollution from inadequate management of wastewater and solid waste, liquid and hazardous materials management, disturbance and displacement of wildlife, etc.;
- Presence of migrant workers in rural areas: health concerns such as HIV/AIDS, social disturbances, overexploitation of local resources such as water, fire wood and other natural resources such as fauna (poaching);
- Transportation and traffic related to movements of manpower, machinery and construction materials: noise, dust, security;
- Excavation works, earth-moving and tower construction activities: natural vegetation and crop damages, soil erosion, removal of trees, siltation and contamination of surface water, encroachment in wetland, disturbance and displacement of wildlife;
- Waste and contaminant (engine oil, fuel) disposal: soil and water pollution.

The main sources of negative impacts during the project operational phase are mainly:-

- Maintenance (clearing) of the ROW: permanent control of vegetation using mechanical or chemical methods, although mechanical methods should be preferred;
- Presence of the transmission line as an obstacle to movement of birds: mortality through collision;

- Presence in the landscape of the line itself: visual impact and landscape degradation.

The main sources of negative impacts during the project decommissioning phase are mainly:-

- Removal of power line infrastructure, breaking up of tower foundations and re-contouring the surface: increase in fugitive dust emissions and noise, water and soil pollution from inadequate management of wastewater and solid waste, liquid and hazardous materials management, disturbance and displacement of wildlife. Loss of job and income to villages on security payment (MoU) depending on number of towers per village

It should be noted that the layout retained has already been optimized during the scoping and prefeasibility phases in 2011 in such a way as to avoid the main sensitive social and environmental components: villages, public buildings, protected areas, wetlands and swamps, forests, etc.

5.3.3 Nature of Impacts

The project will generate impacts during the pre-construction, construction, operational and decommissioning phases. It will require construction works that will extend over at least two years. Moreover, the maintenance of the ROW substation and of the line requires periodic access to the facilities all along the project lifespan.

Permanent Impacts

Permanent impacts are related to the operational and maintenance phases of the transmission line. Maintenance and repair of equipment include all activities required to ensure at all times the good operation of the line. Maintenance consists especially in preventive measures for verification and repair of equipment. Teams especially trained for that task will move under conductors on the ground, at various intervals, in order to make observations on conductors, insulators, towers, etc. The ground patrol is done from the existing road network with four-wheel drive vehicles, whatever the season. Repair consists in rehabilitation of defective equipment. According to the nature of the break or fault, light or heavy machinery could be used in the ROW.

Maintenance of the ROW also requires regular clearing of vegetation in order to reduce short-circuit risks caused by electric arcing. Mechanical methods should be preferred to chemical methods for vegetation clearing.

The main permanent environmental and social impacts are:-

- Soil erosion;
- Permanent loss of vegetation (trees and shrubs) in the ROW;
- Modification to terrestrial wildlife habitats;
- Risks for birds' collision with the wires and towers;

- Displacement of inhabitants living in or near the ROW;
- Loss of buildings and other infrastructure.

Permanent losses of agricultural, grazing land or otherwise valuable land, as well as small portions of wetland are required for construction of towers. Impacts on particularly attractive landscapes are also taken into account in this ESIA because they will persist throughout the project lifetime.

Temporary Impacts

Temporary impacts are mainly those related to the construction and decommissioning phases. They consist in:

- Dust and noise emission;
- Soil erosion;
- Degradation of water quality;
- Soil contamination by inappropriate waste management or contaminant accidental spill;
- Disturbance and displacement of fauna;
- Crop damages;
- Temporary land acquisition for construction camp;
- Disruption of traffic and access.

Most of the temporary impacts listed above could also be generated by maintenance activities, during the operational phase.

5.4 Impacts on Physical Environment

Soils

5.4.1.1 Construction Phase

The corridor is mostly covered by ferralitic soils which represent the final stage in tropical weathering. These soils are very sensitive to disturbance and thus vulnerable to soil erosion. Preparation of foundations for towers will cause destabilization of soils, especially in areas with raised terrain vulnerable to soil erosion. Construction of access roads is also likely to lead to soil erosion in erosion prone areas.

Although tower foundation design is not completed at this stage of the project, it is anticipated that a surface area of about 5,5 m by 5,5 m and 2,5 m deep, depending on soil conditions, will be required. Hence, surface areas affected by the installation of concrete tower foundations will not be significant. However, excavators may leave some destabilized bare areas, which are vulnerable to soil erosion, especially in hilly areas.

Soils in some wetland areas are hydromorphic, seasonally or permanently water-logged, and mostly clayey and undifferentiated alluvium. These are termed as fragile soils, but also with bad soil

conditions, making excavation for towers very difficult. Therefore, a depth of 4 to 5 m may be required for tower installations. As previously mentioned, tower foundations have not been designed yet. These numbers are provided as a rough estimate. The use of heavy machinery on access roads constructed in wetlands will lead to soil compacting and modify the structure of the soil. However, installation of towers as well as construction of access roads in wetlands will have to be avoided as much as possible to minimise impacts on these fragile habitats.

During construction, oil leaks from machinery are likely to cause punctual soil contamination.

In order to minimize the impacts on soils, erosion prone areas, such as steep slopes, should be identified and monitored. When required erosion-control measures should be established and implemented. These measures could include avoiding vegetation clearing on steep slopes, rehabilitating erosion prone areas immediately following construction activities, properly compacting and seeding areas susceptible to erosion in order to reduce the effect of erosion.

Contractors shall also adapt their work schedule to take into account the rainy season. Some construction activities shall be delayed or interrupted during the rainy season.

Finally, in order to minimise the impact on soil quality, it is recommended to use mechanical means when possible rather than chemical means for vegetation clearing in the ROW. Indeed, it prevents exposing soils to hazardous chemicals and avoids potential spills of these chemicals.

5.4.1.2 Operational Phase

As during the construction phase, maintenance activities during the operational phase may lead to oil leaks from machinery. This could cause punctual soil contamination. Maintenance vehicles will be limited to identified access roads and ROW to avoid damaging soil and vegetation. Mechanical means for vegetation clearing are however preferred to chemical means since they avoid exposing soils to hazardous chemicals.

5.4.1.3 Decommissioning Phase

Activities during the decommissioning phase that may impact soils include revegetation of access roads and removal of power line infrastructure as well as heavy vehicle traffic. Surface disturbance and heavy equipment traffic can lead to soil erosion. Upon completion of decommissioning, disturbed areas would be recontoured and revegetated to minimize the potential for soil erosion.

Contractors shall also adapt their work schedule to take into account the rainy season. Some decommissioning activities shall be delayed or interrupted during the rainy season. During the decommissioning phase, potential oil leaks from machinery are likely to cause punctual soil contamination.

Tanzania sand loam and volcanic soils

In Tanzania, there are sections of the transmission line that are prone to erosion (Photo 19). These areas include Mungumaji in Singida and parts of Arusha District. Construction of towers in these areas is likely to accelerate soil erosion. Thus, design measures to reinforce the towers will be implemented in order to minimize the risk of soil erosion.

Photo 19: Erosion on the Proposed Sites along the Namanga-Arusha Road

Impacts on Soil Quality	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	Minor

Overall, the residual impact on soil quality is considered minor.

5.4.2 Water

5.4.2.1 Construction Phase

Waterways, in the form of streams and rivers, are abundant throughout the proposed corridor. During construction, water quality of waterways can be impacted by soil erosion resulting from driving vehicles through streams, by building temporary bridges, by clearing of vegetation along the wayleave and by excavating soil for tower foundations.

Construction of concrete tower foundation will require (estimates 100-200m3) of water for mixing sand aggregates, cement, lime and others and relatively amount of water for curing the structures, Workers involved in the construction will need water each not less than 100 litres daily, Reliable source of water will be streams, rivers dams and lakes along the 400KV corridor and adjacent areas. Water user permit need to be solicited from the relevant Authorities prior to commencement of construction.

In addition, a lot of spoil material will be generated from the excavations for tower foundations. Leaving loose heaps of spoil material may cause soil erosion and silting of watercourses leading to the modification of water quality. Wetlands, especially larger ones that may have several towers and where road accesses may be constructed, will also be impacted. Sediment deposits could disrupt the normal flow of water in the wetlands and flood plains, leading to siltation and flooding flood plains or drainage routes, which could contribute to silting problems.

Drainage disruption may also be expected during preparation of tower foundations either in the middle of the wetland or on their fringes. Any accidental oil or lubricant spillages occurring during excavations in wetlands or near a watercourse will result into pollution of these watercourses. The littering of refuse by the workforce in the environment may result in contamination of water sources leading to microbial contamination of surface water and water borne diseases. Construction is expected to be mainly mechanized and thus, the workforce expected to participate in the construction at any one time will not be significant. A waste management programme will be developed by the EPC contractor and will namely include the provision of an appropriate number of toilets at work sites. Impacts of the project on waste generation are short-term and expected to be minimal.

The main impacts on drainage and water resources include drainage disruption and modification to water quality resulting from the construction of access roads and tower foundations, siltation caused by soil erosion and contamination caused by oil and lubricant spillages.

Proper mitigation measures namely include limiting construction activities to the dry season, maintaining a vegetation buffer along both sides of all water crossings and upgrading existing bridges rather than constructing new bridges for water crossings, avoid installing towers in wetlands as much as possible, removing backfill from wetlands when tower erection is completed, use of proper machinery in wetlands; solicit user permit right from relevant authority(Table 27 in Chapter6).

Finally, contractors shall also adapt their work schedule to take into account the rainy season. Some construction activities shall be delayed or interrupted during the rainy season.

5.4.2.2 Operational Phase

During the operational phase, maintenance activities may lead to the same impacts as the one likely to be felt during construction. Water quality of waterways can be impacted by soil erosion resulting from driving vehicles through streams. Accidental oil or lubricant spillages can also affect water quality.

Because access roads and foundations will be permanent, drainage disruption may constitute a long-term impact. Road erosion leading to the modification of water quality and siltation is another long-term potential impact as the roads will be made of murram. If properly mitigated, pollution and siltation impacts can however be of short-term duration.

Proposed mitigation measures implemented during the construction phase will allow for minimising the impacts during the operational phase (Table 27 in Chapter 6). Such measures include avoiding as much as possible the construction of access roads and installation of towers in wetlands or in/adjacent to river banks, installing culvert or bridges for temporary and permanent access roads, prohibiting vehicles from driving in the watercourses.

5.4.2.3 Decommissioning Phase

Decommissioning activities could affect water quality through accidental oil and lubricant spillages. Driving vehicles in the streams may also increase the likelihood of soil erosion and siltation in the streams. These impacts would however be of short-term duration. Mitigation measures proposed during the construction phase will also be implemented during the decommissioning phase.

There are no major wetlands or rivers along the transmission line half way of the way leave from Namanga to close to Manyara Ranch, and also the last 30km ascending to Singida. However, there are numerous seasonal streams that only have water during the rainy season (Photo 20).

Photo 20: Dry Seasonal Stream

However in some areas, the transmission line passes through wetlands e.g. in Magugu from B22A to B22G, in Dareda at B27J and passes through Balangdaleruu wetlands from B47 to B49 (Appendix 1). Similarly, the transmission line crosses the Dareda, Bagara and Maskta rivers. The line also crosses a number of seasonal streams characterising the valleys. Therefore, several towers are likely to be located in these wetland areas and their construction will lead to clearing of vegetation for foundations and access routes. Tower locations will however have to be planned adequately in order to limit the number of towers in wetlands.Thus, the impact will be more significant in these larger wetlands but minor in other smaller wetlands and drainage systems, bearing in mind that some of these wetlands have already been impacted by growing rice and horticulture activities, such as in Lake Babati.

Impacts on Water	
Intensity	Medium
Extent	Punctual
Disturbance Level	1
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	**Minor**

Overall, the residual impact on water quality and drainage is considered minor.

5.4.3 Air, Noise and Vibrations

5.4.3.1 Construction Phase

Modification to air quality and increased noise and vibrations will be an issue during the construction of access roads and clearing of vegetation along the ROW. Dust emissions may particularly affect air quality since it is recommended that construction takes place during the dry season. A few mitigation measures are proposed to minimise the impact on air quality (Table 27 in Chapter 6). These measures include, among others:

- Protecting stockpiles of friable material subject to wind erosion with a barrier, windscreen or vegetation;
- Cover loads of friable material during transport;
- Restrict vehicle speed on loose surface roads during dry or dusty conditions.

In some locations, work will be done in close proximity to residences, farms or businesses located along the ROW. Traffic, as well as the use of construction equipment and machinery, will result in temporary noise emissions. Other than in urbanized areas, there has been minimal noise stress in the project areas prior to the construction. Noise resulting from the construction of access roads and transmission line may disturb neighbouring communities and local fauna. This impact will only be of a temporary nature and can be minimised by adopting appropriate mitigation measures. These measures namely include maintaining equipment and vehicles to manufacturers' standards and limiting operating times to daylight hours (Table 27 in Chapter6).

Where explosives will be used i.e. blasting during foundation excavation there could be significant noise and vibrations in areas adjacent to construction activities and sometimes causing cracks to building. Information of blasting incidence, time should be available either written or disposed on local gathering areas e.g. Local brew clubs, churches or mosques. A plan to deal with the vibration victims in regard to affected structures should involve the local authorities. This impact will be sporadic and short term.

5.4.3.2 Operational Phase

During maintenance activities along the ROW, air quality may slightly be modified. Noise and vibrations will also increase. The modification of the air quality, as well as noise and vibrations resulting from the maintenance of the transmission line may disturb neighbouring communities and local fauna. However, these impacts will be temporary since they will only be felt during maintenance activities. Mitigation measures proposed during the construction phase also apply to the operational phase. These measures will minimize the impacts on air quality as well as the noise and vibration increase and, by extension, disturbance to local communities and fauna.

The other types of noise that can be heard during the operational phase are sizzles, crackles, or hissing noises that occur during periods of high

humidity and are usually associated with high-voltage transmission lines. These noises are very weather dependent. They are caused by the ionization of electricity in the moist air near the conductors. Although this noise is audible to those very close to the transmission lines, it quickly dissipates with distance and is easily overshadowed by typical background noises. The existing transmission line does not seem to cause any problem in this regard since no indications were given by the populations consulted.

5.4.3.3 Decommissioning Phase

During the decommissioning phase, the same impacts will be felt on air quality, noise and vibrations as during the construction phase. Moreover, the same mitigation measures are proposed to minimize these impacts.

Impacts on Air, Noise and Vibrations	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Duration	Short-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

Overall, the residual impact of the project with regards to air quality, noise and vibrations is therefore minor.

5.5 Impacts on Biological Environment

5.5.1 Flora

5.5.1.1 Wetlands

Construction Phase

The construction of transmission lines and access roads can have impacts on wetland vegetation, which can be destroyed by heavy machinery or permanently damaged by changes in wetland hydrology.

Clearing forested wetlands can also affect the vegetation by exposing the wetlands to invasive and shrubby plants such as *Mimosa pigra*, *Tothonia* and *Lantana camara,* thus removing habitat for species frequenting forest or swamp interior.

Vehicles and construction equipment can introduce exotic plant species like water hyacinth (*Eichhornia crassipes*). With few natural controls,

these species may out-compete high-quality native vegetation, destroying valuable wildlife habitat.

During the construction phase, mitigation measures are proposed to minimise the impacts on vegetation (Table 27 in Chapter6). These measures include, among others:

- Minimising vegetation clearing;
- Avoiding construction of the transmission line through wetlands;
- Adjusting tower location and span length to avoid wetlands;
- Where it is not possible to completely avoid wetlands, use mats and wide-track vehicles when crossing wetlands;
- Regular control of vehicles to prevent introduction of invasive species;
- Carefully clean construction equipment after working in areas infested with known invasive exotic species.

Operational Phase

The maintenance of transmission lines and access roads during the operational phase can have impacts on wetland vegetation, which can be destroyed by heavy machinery or permanently damaged by changes in wetland hydrology.

Vegetation clearing in the wetlands, for the maintenance of the ROW, can also have impacts on wetland vegetation by exposing it to potential invasive flora species. The vehicles and equipment used for maintenance activities can also introduce exotic species which can modify wetland habitats.

As previously mentioned, the minimisation of vegetation clearing, the use of mats and wide-tracks vehicles and the cleaning of construction equipment will allow minimising the impacts on wetlands.

Decommissioning Phase

Impacts likely to be felt during the decommissioning phase are the same as those anticipated during the construction and operational phases. The same mitigation measures are thus proposed.

As mention above the transmission line passes through some wetlands. Although the vast majority has been modified through rice growing, they still have a certain biodiversity. Some of these wetlands (Magugu between angles B22A and B22G, Dareda at B27J, Balangdaleruu between B47 and B49) are 1 to 4 km large, implying that a few towers are likely to be located in these wetland areas (Appendix 1). Areas will be cleared of vegetation to build access roads and install foundations. These access roads will encourage encroachment of the wetlands hence opening up more wetlands for agricultural purposes. Vegetation clearing for the ROW will be long-term because the ROW will be regularly maintained. Although only a strip of 90 m wide will be cleared. Surface areas affected by access roads and foundations for the transmission line

can not be determined at this stage since technical details on these infrastructure are not available yet.

5.5.1.2 Terrestrial Vegetation

Construction Phase

Building a transmission line through woodlands found along the proposed corridor requires that trees and bushes be cleared from the wayleave. This encroachment can have impacts on the number, health, and survival of interior forest species, some of which may be of conservation concern.

In the construction phase, the natural vegetation and crops will be damaged during clearance of access roads and ROW, as well as by construction equipment manoeuvring and parking outside demarcated areas, and earthworks. Vegetation damage will lead to habitat destruction. Habitat destruction for instance shall be trees, in the cultivated and non-cultivated areas, wetland vegetation and shelter, ornamental or fruit trees (mangoes, avocados, pawpaws, jackfruit, oranges, etc.) around homesteads. Undesired or harmful exotic species can also be inadvertently brought in during construction activities.

In order to minimize the environmental impacts, it is recommended that clearing is done manually as much as possible with no burning of the cleared vegetation. In order to reduce the impact of firewood used in the worker's camps, it is recommended that wood from the clearings, not located on the land of the communities, is transported to the camp sites. It is important to reiterate that the towers spans may have to be modified on the river belt to reduce impact on the ecologically rich riparian areas, either from construction machines, or from clearing for wayleave. It is also recommended that reforestation program be initiated to off-set any loss of trees. Other mitigation measures are proposed to minimise the impacts of construction activities on the vegetation (Table 27 in Chapter 6).

Operational Phase

Periodic maintenance along the ROW will require clearing of vegetation regrowth along and adjacent to the line. This means no vegetation will be allowed to grow above 5 m within the wayleave. This will be felt more in the areas where the proposed 400 kV will run parallel to the existing 220 kV. As in the construction phase, clearing of vegetation will be done manually as much as possible. Other mitigation measures, proposed for the construction phase, will be implemented during the operational phase to minimise the impacts on the vegetation.

Decommissioning Phase

No adverse impacts on vegetation are anticipated during the decommissioning phase. One positive impact should however be the revegetation of the site once the infrastructure is removed.

From Namanga, the transmission line will pass through shrub land, savannah grasslands and open woodlands a cross boundary ecosystem the predominant vegetation forms are shrub land and savannah with scattered trees and shrubs (Photo 21). Most of the woodland is open and with low trees very few scattered estimated at 5 trees per Ha grow beyond 6meters and of diameter at breast height of 30 - 45 cm and bushes, vegetation clearing will be affected in the wayleave since the few higher trees and shrubs above 5 m will be cleared to create an open stretch in the bush land, woodland and forest land. While impact on woody vegetation is going to be permanent, impact on grasses and herbs is mostly transient.

Photo 21: Savannah with Scattered Trees and Shrubs South of Bisil extending also to areas in Oldonyosambo, Mbuyuni Makuyuni Military camp

The line passes in miombo woodlands, in Kisasida, Mughamo and Msikii villages. These woodlands are highly disturbed by agricultural activities, charcoal burning and firewood collection close proximity to town. At Sigino village, the line passes East of the well maintained forest reserve composed of *Brachystegia* ssp. The proposed line will run parallel to an already existing transmission line but will not affect the forest reserve. Similarly, in Singida Region mainly in Mungu Maji village, the proposed project will affect some eucalyptus trees but no plantations. Local communities plant some eucalyptus trees for construction purposes or as a cash crop (Photo 22).

There are also 14 community forests that will be affected by the wayleave. They are located in Mogitu, Mara. Bagara, Kinyagigi, Mwada, Sigino, Kiongozi, Mawemairo, Mesenanijuu, Vilima vitatu, Kimokowa, Nandwa and Minjingu. The exact location and affected surface areas of these community forests are not currently available since they have not been delineated. Additional investigations will thus have to be conducted

prior to construction activities to delineate these community forests. However, in order to minimize the impacts on these community forests and compensate for forest losses, a revegetation program will be implemented in affected areas. This program should involve the local population as much as possible in close collaboration with the Tanzania Forest Service. Local plant species should also be selected for revegetation purposes.

It is estimated that a total of about 3 321 ha of land will be affected by the transmission line (when considering a corridor 90 m-wide and 114 km-long between the border and Arusha, a corridor 90 m-wide and 94 km-long between Arusha and the existing transmission line, and a corridor 70 m-wide and 207 km-long between the existing transmission line and Singida).

Photo 22: Eucalyptus Trees at a Local Farm

Impacts on Vegetation	
Intensity	Low
Extent	Local
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	**Minor**

Given the mitigation measure proposed, the residual impact on vegetation is estimated to be minor.

5.5.2 Fauna

5.5.1.1 Fish and Aquatic Life

Construction Phase

Construction activities and equipment that crosses wetlands and watercourses can stir up sediments, endangering fish and other aquatic life. In addition, clearing overhanging trees and bushes near waterways can result in increased water temperatures, thereby affecting the habitat for fish and other aquatic species.

In other to minimise the impacts on fish and aquatic life, construction activities in wetlands and waterways will be limited as much as possible. Shaded areas in streams will also be maintained, where possible, for aquatic fauna (Table 27 in Chapter 6).

Finally, the presence of workers may also lead to increased fishing activities in watercourses or wetlands located in the vicinity of construction activities. In fact, although workers will be provided with adequate meals, they may be tempted to go fishing during their spare time. However, it will be prohibited for project workers to possess fishing equipment when on project sites.

Operational Phase

The equipment used for maintenance activities which crosses wetlands and watercourses can increase water turbidity, and thus modify aquatic habitats for fish and other aquatic species. As mentioned during the construction phase, maintenance activities in wetlands and waterways will also be limited as much as possible.

As during the construction phase, the presence of workers during the operational phase activities may lead to increased fishing activities in watercourses or wetlands located in the vicinity of maintenance activities. However, fishing gear will be prohibited for project workers when on project sites.

Decommissioning Phase

The impacts anticipated during the decommissioning phase are the same as those anticipated in the operational phase. In fact, the equipment used for the dismantlement of infrastructure may cross wetlands and watercourses and affect aquatic habitats by increasing the water turbidity. Fishing activities may also increase due to the presence of workers.

The same mitigation measures proposed for the construction and operational phases also apply to the decommissioning phase (27 in Chapter 6).

In total, there are no anticipated impacts on fish and aquatics species as there are no lakes or significant water bodies likely to be affected by the project.

Impacts on Fish and Aquatic Life	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Value of Element	Low
Duration	Short-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

Overall, the importance of the residual impact on fish and aquatic life is estimated to be minor.

5.5.2.2 Terrestrial Fauna

Construction Phase

During the construction phase, the terrestrial fauna will mainly be affected by habitat destruction and noise. Due to widespread settlements throughout the corridor and accompanying human activities, the terrestrial fauna have virtually disappeared from the proposed line corridor except in some cases where wetland fauna and a few others have adapted to settled-in areas. The terrestrial fauna is likely to be affected by noise due to construction activities related to transport, vegetation clearing, etc. The terrestrial fauna is however likely to migrate to similar but quieter habitats located in the vicinity.

Furthermore, vegetation clearing during the construction phase may lead to habitat fragmentation which, in turn, can cause a permanent reduction in species diversity disturbing roosting and breeding areas and suitable habitats.

New access roads required for construction of the transmission line may lead to increased grazing and bush meat hunting. The presence of workers may also lead to increased hunting and poaching activities. In fact, although workers will be provided with adequate meals, they may be tempted to hunt during their spare time. However, hunting bush meat will be forbidden for all project workers, In addition, it will be prohibited for project workers to possess firearms, snares and other hunting equipment when on project sites.

Several mitigation measures have been proposed to minimise the impacts on the terrestrial fauna (Table 27 in Chapter 6). These measures namely include:

- Minimizing vegetation clearing, thereby limiting habitat destruction;

- Restoring ancillary sites as soon as they are not required anymore, such as borrow pits, camp sites, material storage piles;
- Monitoring of migration corridor used by large mammals, taking into account migratory patterns and preventing construction during identified specific periods;
- Prohibiting wildlife disturbance and poaching.

Operational Phase

The only impacts anticipated during the operational phase are those related to maintenance activities. In fact, these activities will lead to the disturbance of the terrestrial fauna present in the vicinity of the transmission line. The disturbance will however be punctual and of short duration. Moreover, the mitigation proposed to minimise the impacts of construction activities on the terrestrial fauna also apply to maintenance activities.

In addition to wildlife disturbance, the presence of workers during maintenance activities may lead to increased hunting and poaching. The number of workers will however be very limited during maintenance. As during the construction phase of the project, hunting bush meat by workers will also be prohibited. Moreover, it will be prohibited for project workers to possess firearms, snares and other hunting equipment when on project sites.

The presence of the transmission line should not significantly affect the terrestrial fauna movements. It is anticipated that migrating animals will continue to cross the wayleave. When meeting with wildlife authorities (it was mentioned that wildlife disturbance would be of temporary nature and mainly during construction, maintenance and decommissioning activities. According to some wildlife authorities, if the line is high enough, it should not affect wildlife movement. Sagging in animal routes below 8 meters should be prohibited by provision of supporting closer towers Moreover, the wildlife authorities that were met during the consultation process have not expressed any significant concerns regarding the impact of the presence of the line on terrestrial fauna (which excludes bird species,

Decommissioning Phase

During the decommissioning phase, the dismantlement of infrastructure will lead to the disturbance of the terrestrial fauna which is likely to move to quieter areas located nearby. This impact will be of short duration. Wildlife will thus be able to frequent the area once decommissioning and revegetation activities are completed.

As during the construction and operational phases, hunting and poaching may increase since workers will be present in the area. However, the same mitigation measures will be applied as during the construction and operational phases of the project (Table 27 in Chapter 6).

. The transmission line will cross a number of wildlife migration corridors, such as between Tarangire and Lake Manyara national parks in the sector of Mwada, Vilima Vitatu, Olasite, Minjingu and Makuyuni, which

currently constitutes a wildlife management area under Burunge CBO. Another important migration corridor is the corridor joining Lake Natron to Arusha and Kilimanjaro national parks (Map 5.1, Chapter 5). This corridor will also be affected by the portion of the transmission line extending between Arusha and Namanga.

These wildlife corridors will mainly be impacted by the presence of workers and machinery, clearing of vegetation, and construction activities. These sources of impact will lead to disturbance and displacement of wildlife and potentially to overexploitation of natural resources (i.e. poaching of wildlife species). Such impacts will mainly be felt during the construction and maintenance phases of the project.

Impacts on Terrestrial Fauna	
Intensity	Low
Extent	Local
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	**Minor**

Overall, the residual impact on terrestrial fauna is considered minor.

5.5.2.3 Birds

Construction Phase

Construction activities will lead to vegetation clearing which may cause habitat modification or fragmentation for certain bird species. Vegetation clearing will however be minimized as much as possible to limit habitat destruction. Construction activities will also lead to increased noise which may disturb the bird species present in the area. However, as for the terrestrial fauna, the avifauna is likely to migrate to similar but quieter habitats located in the vicinity of construction areas.

Photo 23: Nesting birds close to Longido District Headquarters

Operational Phase

The presence of the transmission line may cause impacts to the avifauna since it is likely to cause wounds and mortality through collisions against conductors or cables, as well as electrocutions.

For some years now, a lot of literature on the issue of bird collision with electric lines has been produced especially in Europe and America. Unfortunately, little research has been conducted in Africa. In spite of that, the potential impact of the future transmission line on bird mortality must be considered. In addition, the Resolution 7.4 on electrocution of migratory birds of the Convention on Conservation of Migratory Species of Wild Animals (CMS) require signatory parties, including Kenya and Tanzania, to invite all interested people to implement, as much as possible, the measures contained in the document UNEP/CMS/Inf.7.21, which are based on the principles according to which birds should not rest on parts dangerously near high voltage sections of power transmission lines».

The risk of electrocution is particularly high for birds with wide wingspan, such as raptors and some waders. In fact, they are often victims when they rest high on towers and take off. When their wings are deployed, they risk getting in contact with two electric wires, and therefore be electrocuted.

Lines for which conductors are placed at various heights and/or include common wires high above conductors are the ones that cause most risks because of their position at several levels, which is the case of the transmission line that will be installed. However, that risk is basically real for medium and low voltage lines, where the distance that separates the wires is lower than the animal's wingspan. It is a less probable risk with a high voltage line such as this 400 kV transmission line.

In addition to electrocution, the risk of collision with wires is probable because of their height and because many birds hardly perceive horizontal lines. That risk is however more important in zones with strong

topography or in areas with high and dense vegetation coverage, because birds do not see the wires, or see them too late.

Various situations increase mortality risks among birds:-

- Sliding effect: when a slope in the topography channels the flow of (local or migratory) birds. In that case, a perpendicular line to the slope is most dangerous;
- Barrier effect: when a valley concentrates birds that preferentially move in one direction. In that case, a perpendicular line is very damaging;
- Take-off effect (a micro-effect in the general environment that is one of the most mortal): isolated wood or tree placed in the traffic corridor makes birds go up towards the line, which is often dissimulated by the obstacle and discovered at the last minute.

Bird strikes and mortality are also more important in areas with high bird densities, such as waterfowl breeding colonies or staging areas. Water areas constitute seasonal or short-time stopovers for migratory birds. These are especially important for species that pursue their flight towards the rainy forest. Appropriate mitigation measures, such as the use of reflectors, will be implemented in order to prevent mortality risks for migratory birds using staging areas located within or near the transmission line corridor. Shine and turn to the wind markers are proven to be the most efficient to improve visibility of transmission lines.

Although the number of bird collisions on the existing 220 kV line is not reported to be high and that most of the bird species identified in the project area are common and widely distributed in wetlands, there is need for precautionary measures to be taken by making the transmission line more visible (Table 27 in Chapter 6). Proposed measures include installing reflectors on the ground wire at intervals along the line in specific areas such as wetlands, staging areas or in bird migration corridors. Also, in areas of high bird density, it is proposed to use specially-designed towers so that the conductors of the new line are at the same heights as those of the existing line it parallels. Additional studies have been done prior to completion of final project design to identify big-risk areas where these measures could be implemented. However a continuous assessment need to done and mitigations improved according to challenges encountered. The proposed

Finally, raptors/birds prey density is/will be on an increase along the transmission line corridor since they are/ will tend to use the wires and towers as lookout for nesting, roosting breeding and hunting. Since there will not be any dense and woody vegetation, also clear vision around homestead, it will be easy for raptors to spot their prey from far away. Among the prey have been domestic freelance feeding chickens, previously dependable income generating activity now disturbed as narrated at Lemugur village where a proposed substation is to be constructed. The common under neck white collar crow has been new invasive species since the construction of the 220kv line to Singida. Chicken keeping are no longer a cost-effective IGA to women, because chicks fall prey to the crow which now inhabits in 220kv towers. Alternative IGA e.g. goat and sheep support should be sought. Protective

materials for enclosure of young chick like wire fencing and chick support feed for nearly two months can partial offset the bird access to chicks prey. Maintenance activities may also disturb the avifauna present in the area. However, the bird species will easily migrate to similar but quieter habitats located in the vicinity of the transmission line. Moreover, this disturbance will be punctual and cumulative.

Decommissioning Phase

As for the terrestrial fauna, the dismantlement of infrastructure during the decommissioning phase will lead to the disturbance of the avifauna which is likely to move to quieter areas located nearby. This impact will be of short duration. Bird species will thus be able to frequent the area once decommissioning and revegetation activities are completed. The mitigation measures proposed for the construction and operational phases will also be implemented during the decommissioning phase in order to minimise the impacts (Table 27 in Chapter 6).

As previously mentioned, water areas constitute seasonal or short-time stopovers for migratory birds. The impacts on birds will thus mainly be felt in these areas. Birds migrating from Lake Natron to nearby lakes, as well as from Lake Manyara to Lake Burungi are most likely to be affected by the presence of the transmission line. Other areas include Lake Singida, Lake Kindai, Lake Balang'dalalu, Gendabeand Basutu,Oloboro hills,elunata Dam and Bubu areas, all areas coordinates have been predictable. Precaution measures will be taken to improve visibility of the transmission line in order to avoid bird strike and mortality. As bird species fly at different heights from the ground, birds sometimes do collide with overhead cables, therefore, to prevent bird collision, fitting markers (Reflectors) attached to wires such as colored balls to improve live visibility for birds especially Flamingos when flying at night**.** Markings should be set on Bird fly way on wires most preferred option e.g. Spheres, swinging plates, flags, ribbons, aviation balls and tapes. These markings have shown efficiency in mitigating collision mortality.

Finally, in areas of high bird density, specially-designed towers will be used so that the conductors of the new line will be at the same heights as those of the existing line that it parallels. This will avoid significantly increasing the risk of collision. Some High bird density areas subject to be crossed by birds, have been determined during the appraisal of the use of migration corridors by birds and large mammals conducted in late October 2013. See attachments as separate reports; of important bird areas (IBA's) birds and wetlands doc)

Impacts on Birds	
Intensity	Low
Extent	Local
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	**Minor**

Overall, the residual impact on birds is considered minor.

5.5.2.4 Endangered / Threatened and Protected Species

Construction Phase

Vegetation clearing in the ROW can lead to the destruction of special status plant species as well as to habitat modification or fragmentation. As for vegetation clearing, construction activities can also lead to displacement and disturbance of special status wildlife species. In fact, the construction of the transmission line may alter their habitat, which could then become unsuitable. Abundance and distribution is problematic for some species of special concern although complementary studies would allow for a better appreciation of these species state. It should however be noted that vegetation clearing will be limited as much as possible in order to minimise habitat destruction (Table 27 in Chapter 6).

Operational Phase

Maintenance activities during the operational phase will lead to the same impacts as during the construction phase. The same mitigation measures will also be implemented. These impacts will however be less intense, punctual and felt on a shorter period.

Decommissioning Phase

The dismantlement of infrastructure during the decommissioning phase may lead to the disturbance of special status wildlife species. These species will however be able to frequent the area once decommissioning and revegetation activities are completed.

The impact of vegetation clearing and possible habitat destruction, especially in migratory corridors, could affect a number of rare, threatened and endangered wildlife species such as elephants, leopards, roan antelopes (*Hippotragus equines*) and sitatunga (*Tragelaphus spekii*). More importantly, the presence of the transmission line is likely to have an impact on birds migrating from Lake Natron to nearby lakes and

from Lake Manyara to Lake Burungi. Endangered bird species likely to be affected include both lesser and greater flamingos (*Phoenicopterus minor, P. roseus)*, Olive ibis (*Bostrychia olivacea*), the African crowned eagle (*Stephanoaetus coronatus*), and the Red-chested owlet (*Glaucidium tephronotum*).

Project activities could also lead to the disturbance of these special status species, although this impact is less significant.

The impact on this component is impossible to assess due to the lack of information about the status of endangered species in the project area. Additional studies are necessary to confirm the situation. These studies should be conducted by environmental specialists at a later stage when project design is better defined and should be prior to preconstruction activities.

5.6 Impacts on the Human Environment

The main preoccupations of many households concern land acquisition, resettlement, behaviour of land surveyor, land and house valuation and compensation, as expressed in most consultation meetings (see Chapter 4). In Tanzania, some bad experiences, including the existing 132 kV transmission line from Singida to Arusha, which was constructed prior to the current Land Act of 1999, has led to different fears for many households. These fears include a lack of or too small compensation, a delay of payment, a lack of transparency in the compensation process, etc.

Demolition of buildings is a very sensitive issue and can often become political. If not well-handled, demolition of houses can derail the project. That is why proper compensation should be given before houses are demolished and adequate time to reconstruct them should be given prior to the project's construction activities. The RAP is presented as a separate document containing all the details on compensation and resettlement issues. The RAP suggests that the resettlement and compensation program be initiated one year prior to the construction phase. The various mitigation measures proposed in response to the preoccupations and reactions towards the project are detailed in the Environmental and Social Management Plan (ESMP) presented in Chapter 6.

5.6.1 Houses and Secondary Structures

Construction Phase

During the construction phase, house and secondary structures that are located in the wayleave will have to be demolished. There are 297 principal structures (houses, shops, workshops, etc.) that are presently located in the wayleave,. These structures are classified as permanent, semi-permanent or temporary depending on the construction materials used (*e.g.*, concrete, adobe, thatched roof, etc). There are a total of 421

secondary structures that are located in the wayleave. All these principal and secondary structures must be demolished and the occupants displaced.

In the highly settled areas and trading centres, about 20% of affected households have no extra land on which to reconstruct their structure. However, this is different with households in sparsely settled areas, where they have enough space to reconstruct the structures on their land or on an adjacent plot. With proper displacement procedures, appropriate and cost effective compensation measures, the impact of the project on those households will be minimal. Sufficient time and care to assist communities and households is crucial to minimize the impact on these resettlements. It should however be noted that the definite number of households likely to be displaced will be established during the definitive property and asset valuation. Concrete and bricks from dismantled structure will be used to refill on pot hall in tracks, other material can be land filed or recycled. Maps of the transmission line, grouped in Appendix 1, show the concentration of dwellings along the transmission line route and public buildings to relocate.

Camps and temporary project offices

Work organization will be from provisional camps and offices close to the wayleave. These will include residential houses for professionals and semi skilled staff, stores or warehouses, dispensaries and other infrastructures or as need arise. On the 415 km corridor several strategic points will necessity temporary land acquisition requested for temporary camping from relevant authorities. Areas within the way leave may be useful for camping before operation, the impact is minor and controllable.

Operational Phase

There will be no negative impacts on house and secondary structures during the operational phase since these structures will be demolished during the construction phase. Where school building or any building not impinging transport of material or wiring activities, the structures can leave for a moratorium as temporary warehouse during construction or prior organizing a temporary working camp site.

If the new transmission line enables access to electricity for the communities and households in the vicinity of the wayleave, it will however certainly increase the value of these properties.

Decommissioning Phase

There will be no negative impacts on house and secondary structures during the decommissioning phase since these structures will be demolished during the construction phase. For the temporary camps, yards and offices, its recommended they should be offered to the nearby community for public use e.g. schools, dispensaries, social centres.

Principal Structures

As mention above there are 297 houses and 5 shops located in the wayleave. It should however be noted that this number is likely to

increase as during consultation some PAPs revealed that they were planning to construct new houses in the proposed area.

Houses located in the wayleave include 119 tradition houses built with clay and hay, 94 mixed (Photo 6.6) and 84 modern structures built in cement.

Photo 24: Mixed Structure in Tanzania

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Secondary Structures

Within the ROW, there are 414 secondary structures that will be affected by the project. A total of 226 households (42% of affected households) have a secondary structure in the wayleave. These structures include: 87 kitchen structures, 137 toilets/bathrooms, 101 animal sheds, 45 family cemetery/graves, 27 fence/gates, 14 water wells/boreholes and 3 other structures.

The percentage of affected PAPs that have alternative land to rebuild their structures either on adjacent land or within the affected villages varies according from one type of structure to another. Those who claim not having any alternative land are mainly PAPs located in urban areas, such as in Singida and areas with land scarcity, such as in Dareda - Hanang District. Most of the villages that are affected by the project have a low population density which explains why most PAPs have alternative land to resettle.

Impacts on House and Secondary Structures	
Intensity	High
Extent	Local
Disturbance Level	2
Value of Element	High
Duration	Long-term
Significance of Impact	Major
Magnitude of Residual Impact	**Medium**

Due to the number of houses, secondary structures to demolish and number of affected households, the impact is considered medium.

5.6.2 Community Buildings within the Wayleave

Construction Phase

During the construction phase, community buildings that are located in the wayleave will have to be demolished.

Some public/community buildings are located within the wayleave. These buildings are shown on the maps grouped in Appendix 1.

Operational Phase

There will be no negative impacts on community buildings during the operational phase since these structures will be demolished during the construction phase.

During the operational phase, the community buildings located in the vicinity of the wayleave may benefit from the presence of the new transmission line if it enables access to electricity for the communities and households.

Decommissioning Phase

There will be no negative impacts on house and secondary structures during the decommissioning phases since these structures will be demolished during the construction phase.

The following community infrastructures are located in the wayleave and are likely to be impacted by the project:

- Seven schools (Photo 6.8);
- Six churches;
- One mosque;
- One nursing home;

- One CCM office;
- One market;
- One maize milling shop.

These infrastructures will be demolished and relocated outside the proposed wayleave. Thus, the impact of the project on these infrastructures will be significant, bearing in mind the number of people that use them. However, most of these structures can be built on land already owned by the community or by the owner of the building. In some cases, land will have to be bought (*i.e.* for the relocation of three churches and one market). The community leaders presented no objection to their displacement if proper valuation and compensation are provided prior to the project's construction activities to avoid any problems and anxieties in the affected communities. Thus, services offered to the communities will not be affected.

Photo 25: Mungu Maji Secondary School in Singida Located in the Wayleave

Table 24: Electric transmission lines crossed by the line

Impacts on Community Buildings	
Intensity	Medium
Extent	Punctual
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	**Minor**

Overall, the residual impact of the project on community buildings will be minor.

5.6.3 Infrastructure

5.6.3.1 Telecommunications

Construction Phase

There are no anticipated impacts on telecommunications during the construction phase.

Operational Phase

Transmission lines do not usually interfere with normal television and radio reception. In some cases, interference is possible at a location very close to the wayleave due to weak broadcast signals or poor receiving equipment. This impact is thus non significant.

Decommissioning Phase

There are no anticipated impacts on telecommunications during the decommissioning phase.

There are no telecommunication infrastructures within the wayleave. However, some are close to the wayleave, located at about 500 m. Concentration of telecommunication towers are mainly found along the Babati-Arusha road.

Impacts on Telecommunications	
Intensity	Low
Extent	Local
Disturbance Level	1
Value of Element	Medium
Duration	Long-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

There are no significant impacts on telecommunications. The residual impact of the project on telecommunications is considered minor.

5.6.3.2 Roads and Railways

Construction Phase

During the construction phase, the presence of construction vehicles and equipment may lead to increased traffic and affect traffic flow. To minimise the impact on traffic flows, construction vehicles and equipment will normally be sited away from main roads and railways.

Operational Phase

During the operational phase, maintenance vehicles could affect traffic flows. However, since there will be very few vehicles involved, this impact is considered non significant. Mitigations measures implemented during the construction phase will also be implemented during the operational phase.

Decommissioning Phase

As during the construction and operational phases, the presence of vehicles and equipment needed to dismantle the power line may increase traffic and affect traffic flows. The extent of this impact will however be punctual and will only be felt during a short period. Moreover, the same mitigation measure will be implemented.

There are no railway crossings the Namanga Singida 400 Kv line, but a few roads are crossed (Table 25).

Table 25: Roads crossed by the Transmission Line

Major roads crossed	Point of crossing
Tarmac road, Singida – Babati	Hanang
Tarmac road, Babati – Arusha	Mwada, Duka Bovu,
Tarmac road, Arusha – Namanga	Namanga border
Some weathered roads	Within project area

Impacts on Roads and Railways	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Value of Element	Medium
Duration	Short-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

There are no impacts on railways. The residual impact on roads is considered minor.

5.6.3.3 Existing Power Lines and Substations

Construction Phase

The proposed corridor for the transmission line will cross other power lines which may have to be temporarily switched off during construction. This impact will however be of short duration.

Operational Phase

No impacts are anticipated on existing power lines and substations during the operational phase.

Decommissioning Phase

It is anticipated that the impact felt during the construction phase will also be felt during the decommissioning phase. As during construction, the impact will be of short duration.

There are a number of sections where the proposed transmission line crosses the existing Singida – Arusha 220 kV line. These sections are between B39A and B39B at Masakta village, between B47A and B47B just after Ming'enyi and between B51A and B51B at Sagara. The

proposed transmission line also crosses the lower voltage 33 kV and 11 kV transmission lines supplying districts and small towns. No substation or power stations are impacted by the proposed transmission line.

Table 26: Electric transmission lines crossed by the line

Electric lines crossed	Point of crossing
220 kV line	Sagara, Ming'enyi, Masakta
66 kV line	From Babati to Magara
33 kV line	Dareda, Katesh, Babati
11 kV line	In small towns within the project area

Impacts on Existing Power Lines and Substations	
Intensity	Low
Extent	Local
Disturbance Level	1
Value of Element	Medium
Duration	Short-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

Existing substations will not be affected by the project. Overall, the impact on existing power lines is minor.

5.6.4 Cultural Properties

Construction Phase

During pre-construction and construction activities, unknown archaeological sites or artifacts can be discovered and partially destructed by the machinery. Before starting these activities, an archaeological study should be conducted to identify the portions of corridor where there is a high potential of finding unknown archaeological sites or artifacts. In these specific areas, pre-construction and construction activities, and especially excavation works, should be supervised by an archaeologist. Should any archaeological or historic remnants be encountered, construction work should immediately stop along that section, and the National museum authorities and District Executive Officer should be informed.

Operational Phase

There are no impacts anticipated during the operational phase.

Decommissioning Phase

There are no impacts anticipated during the decommissioning phase of the project.

No culturally significant sites were recorded in or near the wayleave.

Impacts on Cultural Properties	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Medium
Magnitude of Residual Impact	**Minor**

Overall, the impact on cultural property will be minor.

5.6.5 Economic Activities

5.6.5.1 Arable Lands and Farming Activities

Construction Phase

Transmission lines can affect farm operations and increase costs for the farm operator. Potential impacts depend on the transmission line design, type of farming, care in designing line corridor and construction requirements and precautions.

Construction of transmission line and towers can:

- Create problems for turning field machinery and maintaining efficient fieldwork patterns;
- Create opportunities for weed encroachment;
- Compact soils and damage drainage channels;
- Result in safety hazards due to pole and ground wire placement;
- Hinder or prevent aerial activities by planes or helicopters;
- Interfere with moving irrigation equipment;

- Hinder future consolidation of farm fields or subdividing land for residential development.

Placement of transmission lines along field edges or between fields where windbreaks have been planted can increase erosion of soils, if the windbreaks must be removed.

In the wayleave, a total of about 3 321 ha of land will be affected (considering a 90 m corridor for 114 km between Namanga at the crossing of border and Arusha, a 90 m corridor for 94 km between Arusha and the existing transmission line, and a 70 m corridor for 207 km between the existing line and Singida). Proper compensation will have to be given before any clearance of ROW begins. The wayleave can however be cultivated, beekeeping or used by grazing animals. Farming households will thus be able to pursue most of their activities in the ROW after construction.

Photo 26: Beekeeping practice in Longido

The trees likely to be affected are namely those on woodlots, around homesteads and those scattered in gardens and woodlands within the wayleave. Trees with the potential to grow beyond 5 m at maturity will be forbidden in an estimated area of about 3 861 ha. Proper compensation will have to be given to these affected households before any clearance of ROW begins.

Crops in the wayleave area will be destroyed or delayed during the construction period. It is however difficult to assess the precise impact on the annual harvest since the exact period and duration of construction in each locality are not known at this stage. For this reason, compensation (cash equivalent) of a year of harvesting of the area under cultivation in the wayleave should be given to all affected households. In addition, crops that may be removed from land to be temporarily used for

construction purposes (camp, access road) will also have to be compensated on the same basis (cash equivalent to a year of harvesting). The actual percentage of household using the wayleave for cultivation is 7% in Kenya and 65% in Tanzania.

Operational Phase

During the operational phase, the presence of the transmission line may lead to improved agricultural storage and processing.

Community access to electricity will depend on the pace and success of the rural electrification programmes and not on the construction of this interconnection project. It is thus difficult to assess the delays involved with the electrification of the un-serviced areas crossed by the project. However, if these sectors are eventually connected to the grid, it will result in improved storage and processing of agricultural products, thus increasing their market value or their selling period.

Storage using refrigerators will preserve fresh food products such as meat, milk products, fruits and vegetables which can be sold or consumed the following days. These improvements could result, on the long-term, to positive impacts such as better prices for agricultural products and increased incomes for farmers.

Decommissioning Phase

During the decommissioning phase, the impacts anticipated are the same as during the construction phase, i.e. crops in the wayleave could be partially destroyed or delayed during decommission activities.

97% of PAPs practice agriculture (cultures and livestock) either as the only economic activity or combining with other occupations, such as businessmen or civil servants. For some of the PAPs, agricultural land is within the proposed corridor and may be affected by the project. Crops grown mainly include food crops for subsistence and cash crops. In most parts of the proposed project, it was revealed that the quality of land affected is very fertile and communities are concerned about getting the same quality of land elsewhere. These fertile lands are mainly located in Hanang District, Singida Rural and parts of Arusha District. Most local people also use land for livestock grazing.

During local meetings, communities recommended that TANESCO allows them to continue their livestock grazing and agriculture activities in the wayleave after construction, but only for seasonal crops that are less than 4,5 metres tall. It was also observed, in the current existing transmission lines from Singida to Arusha and Babati to Mbulu, that local communities are undertaking agricultural activities.

Impacts on Economic Activities	
Intensity	Medium
Extent	Local
Disturbance Level	2
Value of Element	High
Duration	Long-term
Significance of Impact	Major
Magnitude of Residual Impact	**Medium**

Overall, the impacts of the project on economic activities are considered medium.

5.6.5.2 Other Economic Activities

Construction Phase

Other economic activities, such as tourism or pastorals, may be affected during the construction period. In fact, the noise produced by construction activities and equipment as well as the related trucking may disturb economic activities, other than agricultural activities.

Operational Phase

There are no anticipated impacts of the presence of the transmission line on other economic activities.

Decommissioning Phase

The impacts likely to be felt during the decommissioning phase are the same as during the construction phase.

Some economic activities being undertaken by local communities within the proposed corridor may be affected by the project mainly during the construction period. These mainly include: the Burunge Tented Lodge (Photo 6.9) that is within the Burunge WMA in Babati District. The camp manager recommended that the construction phase should consider the low touristy season as an appropriate time for construction activities located close to the lodge to avoid affecting tourism activities. Other activities include an open market in Longido District and five other shops that will have to be demolished prior to the project's implementation.

Photo 27: Lake Burunge Tented Lodge Adjacent to the Project Area

Impacts on Other Economic Activities	
Intensity	Low
Extent	Local
Disturbance Level	1
Value of Element	Medium
Duration	Short-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

The impact on other economic activities is considered minor.

5.6.6 Employment

5.6.6.1 Project Related Jobs

Construction Phase

One of the challenges faced by communities along the Isinya via Namanga-Singida transmission line is the lack of employment. It is expected that all none professional jobs will be available during the

construction of the transmission line for the local population to be employed mainly as casual labourers. As revealed by community consultations, available skills include driving, lumbering, masonry, carpentry. However, employment opportunities will be temporary and the community will only benefit in the short run. Jobs will also be limited because less than 100 people will be expected to work on the line at any time. Therefore, there will be a minimal positive impact on employment as only a few people are likely to be employed. Nonetheless, TANESCO should encourage local leaders to form a project liaison group to assist them in distributing jobs to local communities.

Women should also benefit from employment opportunities during the construction phase. A gender hiring policy, to be implemented by the Contractor, will allow for maximising positive impacts for them. The priority will be given to women for jobs related to cooking and cleaning services at worker camps. Skilled workforce, professional and administrative personnel, will most likely originate from outside the project area, and this may cause some resentment from the local people[4]. Nevertheless, these workers will bring within the project area the much needed additional money to spend.

Operational Phase

During the operational phase, some employment opportunities may be available for the local population to conduct maintenance activities. Cooking and cleaning services may also be needed for maintenance workers. Women should mainly benefit from these jobs given the gender hiring policy that will be implemented by the Contractor. Job opportunities during the operational phase will however be of short duration.

Decommissioning Phase

As during the construction and operational phases, the decommissioning of the transmission line may lead to potential employment opportunities. As for women employment opportunities, they will mainly concern cooking and cleaning services for workers. Jobs during the decommissioning phase will be limited in number and of short duration.

5.6.6.2 Business Opportunities

Construction Phase

Communities affected by the project expect to lose old business due to reallocations but some gain new business opportunities. The

[4] From experience the Contractor may bring his own staff from Nairobi. The locals will expect that most of the workers would be from their locality but a certain minimum experience may be required on site.

construction period will provide local benefits to communities along the line.

TANESCO should encourage local business leaders to form a project liaison group to assist in monitoring local procurement practices. Construction materials (*e.g.,* sand, transport, stones, ballast, wood, etc.) as well as goods and services (*e.g*., canteen, hotel, butcheries, bars, etc.) can be provided locally.

Operational Phase

As during the construction phase, maintenance activities scheduled during the operational phase will lead to the same impacts on business opportunities for affected communities.

Decommissioning Phase

Decommissioning activities will also provide local benefits to communities along the line as it is anticipated in the previous phases.

Impacts on Employment	
Intensity	Low - positive
Extent	Regional
Disturbance Level	2
Value of Element	High
Duration	Short-term
Significance of Impact	**Medium – positive**

Overall, the impact of the project on employment is considered medium - positive.

5.6.7 Rural Electrification

Construction Phase

There will be no impacts on rural electrification during the construction phase.

Operational Phase

One of the most anticipated positive impacts by the population is the increased power supply to the communities, such as schools and hospitals, and households. Should the electrification of the areas crossed by the way leave go ahead, many positive impacts can occur, these include improvement of social services, introduction of new business opportunities and even improved quality/standard of living and education performance in the various schools within the project area.

Decommissioning Phase

At this stage of the project, it is not possible to determine if the decommissioning of the transmission line will affect rural electrification.

Currently in Tanzania, under the central government initiatives, some rural electrification schemes targeting residential areas, social services and trading centres are on-going as it was observed in Longido and Singida Rural districts.

Impacts on Rural Electrification	
Intensity	Medium - positive
Extent	Regional
Disturbance Level	3
Value of Element	Medium
Duration	Long-term
Significance of Impact	**Major - positive**

Overall, the impact of the project on rural electrification is considered major - positive.

5.6.8 Health

Construction of transmission line involves employed people, earning salary, there will be difference in income leading to convincing adultery, and this can lead to school children drop out specifically the girls, divorce, and increase of diseases, inclusive HIV aids

Construction Phase

Construction activities in regard physical installation of infrastructure will not have any impacts on health, for other issues mention above see section 5.6.8,1 below.

Operational Phase

Transmission of electrical energy through high voltage lines poses potential risks and hazards to the population living next to the lines due to the high level of energy flowing in the conductors. However, the relevant safety regulations and proven standard designs, including effective and rapid protection systems, do minimize potential risks and hazards and make transmission lines reliable and safe infrastructure. The established national and international regulations and safety rules applicable to handling of high voltage plant and equipment and the electrical trade in general help to safeguard humans and animals from harm from electrical installations. Thus, the land use restrictions within the way leave will prevent conflict with the energized conductors. Towers and foundations are to be designed according to the best practices and

applicable norms and standards. This will guarantee reliable and safe operation of the line while ensuring safety for the communities neighbouring the line.

Decommissioning Phase

Decommissioning activities will not have any impacts on health.

5.6.8.1 Exposure to Electro-Magnetic Field

Health concerns over exposure to electro-magnetic field (EMF) are often raised when a new transmission line is proposed.

Electric and magnetic fields (EMF) are invisible lines of force that surround any electrical device. Power transmission lines, electrical wiring, and electrical equipment all produce EMF. There are many other sources of EMF as well. Electric fields are produced by voltage and increase in strength as the voltage increases. The electric field strength is measured in units of volts per metre (V/m). For their part, magnetic fields result from the flow of current through wires or electrical devices and increase in strength as the current increases. Magnetic fields are measured in units of gauss (G) or tesla (T). Most electrical equipment has to be turned on, *i.e.*, current must be flowing, for a magnetic field to be produced. Electric fields are often present even when the equipment is switched off, as long as it remains connected to the source of electric power. In summary, voltage produces an electric field and current produces a magnetic field. The US National Institute of Environmental Health Services and the National Institutes of Health have prepared a comprehensive report on electric and magnetic fields associated with the use of electric power.

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, TANESCO, in Tanzania, requires a ROW width of 90 m. All habitations and structures are excluded from the ROW to ensure safety of people and animals from EMFs as well as from direct electric shocks and “flashover”.

Based on a recent in-depth review of extensive scientific literature (World Health Organisation’s International EMF Project), the WHO 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”. The low levels referred to by the WHO are levels expected to be found outside the 90 m in for the Kenya-Tanzania Interconnection Project.

It is concluded that there will not be any adverse health effects to people along the transmission line ROW.

5.6.8.2 Diseases and Accidents

Construction Phase

It is anticipated that during the construction of the transmission line, the population of the project area may increase, leading to a temporary increased pressure on health centres. Malaria in the project area is endemic and workers are likely to get a number of malaria episodes during construction. However, construction workers are expected to be less than 100 at any given time during the construction period.

Influx of workers from outside communities brings risk of spreading communicable diseases such as HIV/AIDS to local communities. To prevent this impact, the EPC Contractor will undertake an awareness programme for communicable diseases for workers and the public inclusive posters and cautions on contractor sign boards for the HIV aids red tape.

Besides infectious diseases, accidents are likely to happen especially to the construction crew and members of the public should they come to the construction area. In fact, construction sites pose potential hazards to both workers and nearby communities because they may raise curiosity, especially among children. In order to prevent any accidents, the EPC Contractor will secure equipment and demarcate any excavations when construction is not in progress. Non-authorized persons will also be kept away from any construction sites. In addition, warnings signs could be posted for public safety. Finally, educational programmes in schools and communities could be implemented to educate people on hazards and safe practice when playing and working beside a high voltage transmission line.

Increased traffic in the villages could be a source of accidents as well. The EPC Contractor will have to develop appropriate strategies to manage moving materials, including abnormal loads and connection points between access roads and main public highways. The EPC Contractor will have to ensure its compliance with all applicable laws, such as maximum load restriction and speed limits. These measures will minimise the risk of accidents due to project related traffic. Although the magnitude of impact on health is expected to be low, it may be long-term in should there be cases of HIV/AIDS.

Operational Phase

During the operational phase, the same impacts as during the construction phase are likely to occur.

Decommissioning Phase

The same impacts as during the construction and operational phases are anticipated during the decommissioning phase.

In the three regions affected by the project there is a Regional Hospital (that of Manyara is on final stages of construction) and each District, except for Longido, have District Hospitals. Almost all wards also have

dispensaries/health centres offering services limited to the Out Patient Department (OPD), Laboratory, and Maternity for basically normal deliveries and in patient services for communicable diseases. In most cases, these facilities are not adequate for the existing population. Liasoning with the relevant institution for a temporary increase of communicable kit requests during construction and decommissioning should be effected during the preparation phase.

Impacts on Health	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

Overall, the impact of the project on health is considered minor.

5.6.9 Aesthetic impacts

Construction Phase

Aesthetic impacts during the construction phase will be limited to the work areas. Moreover, to minimize the impacts of construction activities on the landscape, existing tracks will be used as much as possible. Finally, all temporary construction works, such as borrow pits, will be restored upon completion.

Operational Phase

The overall aesthetic effect of a transmission line is likely to be negative to most people, especially where proposed lines would cross natural landscapes. The tall steel structures may seem out of proportion and not compatible with agricultural landscapes or wetlands.

Research and experience shows that reaction to aesthetic of transmission lines vary. Some residents do not notice them or find them objectionable from an aesthetic perspective. To some, the lines or other utilities may be viewed as part of the infrastructure necessary to sustain everyday lives and activities and are therefore acceptable. To others, new transmission lines may be viewed in a positive way as they are associated with economic development. During the community and household consultations, the aesthetic impact of the project was not mentioned. This indicates that it is not a concern for the impacted populations.

At the feasibility stage, the transmission line corridor route was determined by implementing the following measures in order to minimise impacts on landscape:

- Where possible, straight lines were privileged in order to minimise the need for angle towers which have a more negative visual impact due to their heavier structure;
- Where possible, the transmission line route was positioned immediately adjacent to the existing 220 kV line. This allowed limiting the impacts to an already disturbed area, rather than creating an additional corridor.

Finally, during maintenance operations, existing tracks will be used as much as possible. All temporary construction works, such as borrow pits, will also be restored upon completion.

Decommissioning Phase

As during construction and maintenance activities, decommissioning of the transmission line will lead to temporary aesthetic impacts. Moreover, once decommissioning and restoration work is completed, the landscape will return to its original state.

The aesthetic effect of the transmission line will mainly be felt in areas adjacent to the Tarangire and Manyara national Parks as well as to the Burunge WMA.

In the community or household consultations, the aesthetic impact of the project was not mentioned. In addition, discussions with Lake Burunge Tented Lodge manager also indicated that they have never received complaints from tourists with regard to the current existing transmission line as far as aesthetic value is concerned. This indicates that it is not a concern for the impacted populations.

Impacts on Landscape	
Intensity	Medium
Extent	Regional
Disturbance Level	3
Value of Element	Low
Duration	Long-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

Thus, the residual impact of the project on the landscape is minor.

5.6.10 Gender

The project will impact each gender differently in the communities crossed by the transmission line.

Construction Phase

During the construction phase, impacts of the project on gender are mostly related to employment opportunities and land use by women.

Women will benefit from opportunities to provide goods and services to workers: fruits, meat and other goods, as well as cooking and cleaning services at worker camps. A gender policy, to be implemented by the Contractor, will also allow maximising these positive impacts for women.

In the project area, traditional cultural norms are still important for consideration of education, gainful employment and other social benefits for women and girls. With little education, women have had little access to formal employment; hence represent a negligible proportion of persons employed in professional, technical and administrative occupations as provided for in the project.

In the survey of affected households, 13% are headed by women in project area. These households in particular need help to reduce the impact on their livelihood.

The impact of the project on gender is considered minor as currently, there are various laws that protect women and NGOs/CBOs also sensitize women on their rights and they are very active in the project area.

Operational Phase

Although the impacts on gender are likely to be mostly felt during the construction phase, they are also likely be felt, to a lesser degree, during maintenance activities.

As during construction activities, women will benefit from opportunities to provide goods and services to workers: fruits, meat and other goods, as well as cooking and cleaning services for maintenance workers. A gender policy, to be implemented by the Contractor, will also allow maximising these positive impacts for women.

Decommissioning Phase

Although the impacts on gender are likely to be mostly felt during the construction phase, they are also likely be felt, to a lesser degree, during decommissioning activities.

As during construction and maintenance activities, women will benefit from opportunities to provide goods and services to workers: fruits, meat and other goods, as well as cooking and cleaning services for maintenance workers. A gender policy, to be implemented by the Contractor, will also allow maximising these positive impacts for women.

In the project area it was observed that, women do most of the domestic work as well as tilling the land whose harvest is decided over by men. The land lost due to the project and subsequent loss of crops (annual and perennial) will affect these women more than men because men are usually outside looking for survival elsewhere as women struggle to provide for the household.

Impacts on Gender	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

Even if the impact of the project on women could be positive as mentioned earlier, some minor negative impacts may also occur.

5.6.11 Vulnerable Groups

Construction Phase

Impacts on vulnerable groups will mostly be felt during the construction phase.

Impacts on livelihood and livelihood ability for the potentially vulnerable groups may be more severe than for other affected households as vulnerable groups may have smaller resources to cope with the changes the project entails for them.

In the present case, women and elderly head of households are the most vulnerable groups. No children head of households have been identified in this survey. Therefore particular attention should be paid to the needs of vulnerable groups among those displaced, such as those below the poverty line, landless, elderly, women head of household having the responsibility of children.

Operational Phase

Although the impacts on vulnerable groups are likely to be mostly felt during the construction phase, they are also likely be felt, to a lesser degree, during maintenance activities.

Decommissioning Phase

Although the impacts on vulnerable groups are likely to be mostly felt during the construction phase, they are also likely be felt, to a lesser degree, during decommissioning activities.

Among affected PAPs are vulnerable groups who cannot meet their basic needs and who require special treatment or consideration. They will need support during and after relocation so that they can maintain or improve their pre-project living conditions. The survey identified only 53 PAPs who could be impacted more severely than others due to their vulnerable status. The most affected groups are disabled persons (sick and handicapped) (32%), elderly (28%), widows (9%) and orphans (9%). Finally, 21% have not mentioned why they were considered vulnerable. Others, categorised as elders, were considered vulnerable because of their level of education/understanding issues pertaining to relocation. In most districts, it is possible to find women as head of households. From the socioeconomic survey, it is estimated that 13% households in the villages crossed by the wayleave were headed by a woman, of which most are widows (57%). The small number of women head of household is due to the cultural arrangement of the common ethnic groups in the project area, where women rarely own land.

There are 312 affected households (61%) considered as economically vulnerable since their revenue is inferior to TShs 2 828 750/a[5]. In fact, a household is considered economically vulnerable when it spends less than TShs 1 550 per person, per day.

As previously mentioned, the survey conducted did not identify any concentration of vulnerable households along the ROW from Namanga to Singida.

Impacts on Vulnerable Groups	
Intensity	Low
Extent	Punctual
Disturbance Level	1
Value of Element	High
Duration	Long-term
Significance of Impact	Minor
Magnitude of Residual Impact	**Minor**

[5] Based on the following calculation: 5 members on average in affected households X TShs 1 550 X 365 days.

Thus, minor impacts may affect vulnerable groups.

5.6.12 Minority groups

In project area, there is specific vulnerable (indigenous) group (Barbaig) who are minority or vulnerable ethnic group in the area that need special attention because of their status.

Overall, there are no significant impacts from the project on minority groups. But TANESCO hired Institute of Resource Assessment of UDSM to prepare the Vulnerable (Indigenous) Policy Framework for the whole Kenya Tanzania Zambia interconnection on Tanzania side. As well Vulnerable (Indigenous) Management Plan for the Namanga to Singida through Kisongo substation 400kV TL section.

5.7 Cumulative impacts

Cumulative impacts result from an action when added to other past, present and reasonably foreseeable future actions.

As already indicated in earlier sections, there is an existing 220 kV transmission line passing through some of the areas which is already associated with some impacts of land loss (access roads) or restricted cultivation practices (tree cultivation). The new line will increase the size of the wayleave were these cultivation restriction apply. However, the access roads already present will permit access to the two lines.

Cumulative impacts will be mainly felt at a social level. In fact, the most significant adverse impacts resulting from the project are on the social environment. The main impacts on the biophysical environment are the permanent loss of vegetation (trees, shrubs and planted woodlots) in the ROW and the permanent loss of small portions of wetlands required for the construction of towers. These impacts are however considered minor mostly because of mitigation measures that will be implemented and because of the small surface areas affected when compared to the presence of similar habitats in the area.

On the positive side, the project is part of the national plan of electric power grid improvement in both Kenya and Tanzania. Other projects are also associated with this plan, such as the Mombassa-Nairobi power line and the Nairobi ring in Kenya and, in Tanzania, the “backbone” Iringa-Shinyanga 400 kV line, among others. Furthermore, the Kenya-Tanzania interconnection project will be linked to future interconnections expected to be constructed in 2014 under NELSAP auspices, which will create a power pool composed of Burundi, DR Congo, Rwanda, Uganda, Kenya and Tanzania. This power sharing will minimize the need for power generating plants in each country, reducing globally the production of GHG and other environmental impacts.

As indicated in earlier sections, there is an existing 132 kV and 66 kV transmission line passing through some of the project areas, which are already associated with some impacts of land loss (due to the

construction of access road) or restricted cultivation practices (tree cultivation in the wayleave). The new line will increase the size of the wayleave were these cultivation restrictions apply. However, access roads already present will allow accessing to the transmission lines and therefore the impact is already present except for the small portion of the project, mainly from Arusha to Namanga, where there is no existing transmission line. Besides transmission lines, other projects such as upgrading the Singida -Babati-Arusha road to bitumen standard have also been implemented and have caused impacts; most of which are viewed as negative especially regarding compensation. There is a soda ash plant near Lake Natron but since it is located at about 60 km from the transmission line project, it should not have any cumulative impacts.

In the project area, a few projects are currently ongoing and some are planned. Among the most important projects underway is the Iringa – Shinyanga 400 kV transmission line, which will share some facilities with the proposed power interconnection project. The substation at Singida will be used for both projects. Similarly, in some sections, the proposed Isinya –Singida power transmission line run within the same villages as Iringa –Shinyanga transmission line wayleave. For example, the Isuna and Mungu-maji villages are already affected by the other transmission lines but will again be affected by the new proposed transmission line. The proposed power interconnection line also traverses an area where there is a road project going from Singida to Babati and from Babati to Arusha, up to Namanga. Cumulative impacts emanating from these projects will affect, in part, the communities living along the proposed 400 kV transmission line or those crossed by it. Again in Eworendeke, there is already an international border project that will also involve relocating of houses and business.

CHAPTER SIX

6.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter addresses the project's environmental and social management plan (ESMP) in which the proposed mitigation measures will be presented together with the institutional and monitoring arrangements, in addition to an estimation of ESMP's budget and implementation schedule. The ESMP aims at defining and structuring the measures to be implemented in order to mitigate, optimize or compensate the project's potential impacts identified in Chapter 5. The magnitude of residual impacts upon implementation of the proposed management measures will be assessed. The ESMP will also establish responsibilities for the implementation and oversight of the proposed environmental and social management measures and an indication of their location and estimated costs will be provided.

The ESMP will provide guidelines for a comprehensive monitoring plan which shall ensure, on an on-going basis, the adequate implementation of the proposed environmental and social management measures. Such a monitoring plan will be based on a set of performance indicators and a clear formulation of expected results to be achieved or maintained. Thus, the plan will facilitate on-going adjustments to initial mitigation/maximization measures, within an adaptive management approach. Responsibilities in the implementation and monitoring of the ESMP are to be shared among several stakeholders, including concerned ministerial authorities, contractors, and new coordinating units (the Project Management Unit (PMU) and Project Implementation Unit (PIU)) and consultation committees created for the purpose of the project. The composition, mandate and respective responsibilities of these participants are detailed in section 7.1, on institutional arrangement for ESMP implementation. Finally, the ESMP provides orientations on training and capacity building requirements for its successful implementation.

6.1 Environmental and Social Management Measures

The environmental and social measures proposed to mitigate, maximize or compensate the expected impacts of the preconstruction, construction, operational and maintenance, as well as decommissioning phases is presented in Table 27. For each potential impact, are given: the proposed measures for its mitigation, maximization or compensation; the location and magnitude of the foreseen residual impacts; the bodies responsible for the implementation and the supervision of the proposed measures as well as their associated costs. In addition, Appendix 3 presents a selection of environmental prescriptions for construction activities which should also be included in construction contracts. Please note that the costs of the compensation and resettlement measures are addressed in the distinct RAP report.

Table 27: Environmental and Social Management Plan

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
Soil quality	Preconstruction Construction Operation Decommissioning	• Construction of access roads and tower foundations • Erection of towers • Fuel spills from vehicles circulating in ROW and access roads • Use of chemicals in ROW for maintenance works • Periodic removal of vegetation in ROW • Disposal of waste from construction, operation and maintenance works	• Degradation of soil quality affecting natural habitats and soil suitability for cultivation • Soil erosion • Degradation of soil quality	• Contractors shall adapt their work schedule to take into account the rainy season; some activities shall be delayed or interrupted during the rainy season. • Maintenance vehicles should remain in identified access roads and ROW to avoid damaging soil and vegetation. • Identify and monitor erosion prone areas. Establish and implement erosion-control measures when required: – Prior to construction, install necessary temporary/permanent erosion and sediment control structures. – Access roads along steep slopes should be avoided; roads can be located perpendicularly or diagonally to the slope. – After construction, soil should be levelled and areas stabilized to facilitate vegetation regeneration. – Activities should be carried out in the dry season, especially for wetland areas and water crossings. – Avoid vegetation clearing on steep slopes. – Ensure topsoil is left in a non-compacted condition following completion of works. – Ensure revegetation at the earliest time. – Where erosion occurs on steep slopes, river banks, etc., all exposed soils should be rehabilitated immediately following construction activities. Grass shall be seeded or other measures implemented depending on slope (*e.g*. installation of silt fences). • Strip and save all available topsoil from within the ROW and all ancillary sites, including burrow pits, and make beneficial reuse for site rehabilitation. • Promote mechanical maintenance techniques in ROW, rather than the use of pesticides. • Establish a protocol for pesticides use and storage, promoting a safe and efficient	All project area, especially steep slopes and river crossings	Minor	T3, T4, T12 and others	Contractors, supervised by PMU's Environmental committee	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				management of these products. • Ensure sound management practices for dangerous products and solid wastes. • Ensure that construction, operation and maintenance teams have access to a spill kit at all times.					
Surface water and sediment quality	Preconstruction Construction Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • Spills of chemical products or fuel used for preconstruction, construction and maintenance works • Vegetation removal in ROW for construction and maintenance • Inadequate maintenance of access roads' culverts and bridges • Disposal of waste from construction, operation and maintenance works	• Contamination of runoff or surface waters • Modification of aquatic habitats and/or species in water bodies • Erosion and sediments transport to water bodies	• Limit vegetation removal and drainage patterns alteration. • When applicable, remove backfill from the swamps/wetlands when tower erection is completed. • Survey and peg the designed drainage work prior to construction. • Construct all designed drainage works prior to, during or immediately following excavation work in order to minimize erosion. • Inspect all works and ancillary sites for drainage and erosion problems after each major storm events during the period of construction. Repair all failed drains and take other appropriate actions. • When possible, schedule works requiring large areas of soil disturbance or river crossings to avoid the rainy season. • Promote mechanical maintenance techniques, rather than the use of pesticides. • Establish a protocol for pesticide use and storage, promoting a safe and efficient management of these products. • Ensure sound management practices for dangerous products and solid wastes. • Prepare a waste management plan, including the provision of an appropriate number of toilets at worksites. • Identify and monitor erosion prone areas, including access roads' culverts and bridges. Establish and implement erosion-control measures when required such as outlined above. • Avoid the installation of towers in or immediately adjacent to river banks to reduce the potential for soil erosion into the stream. • All necessary measures should be undertaken to	Major water bodies and streams in the ROW	Minor	T3, T4, T7, T12	Contractors, supervised by PMU's Environmental committee	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				prevent earthworks from impeding cross drainage at rivers/streams, irrigation canal, etc. • Install culverts or bridges for temporary and permanent access roads. • Upgrade existing bridges rather than construct new ones. • Maintain a vegetation buffer along both sides of watercourse crossings. • Prohibit construction, operation and maintenance vehicles from driving in watercourses. • Carry out regular maintenance on all vehicles and other machinery used for construction. • Confine vehicle maintenance to specific areas designed to contain any spill of fuel or lubricant. • Ensure that construction, operation and maintenance teams have access to a spill kit at all times. • Collection, storage and disposal at authorised facilities of waste petroleum products and used oils. • Ensure that the Contractor complies with emergency procedures prior to commencing activities on the site.					
Air quality, noise and vibrations	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • ROW clearance and maintenance • Vehicles circulation on access roads and in ROW • Noise from electric/magnetic field surrounding high voltage installations	• Nuisance to nearby residents, farmers and others users from noise, dust and gas emissions • Disturbance to wildlife species located nearby project activities	• Protection of natural vegetation along the ROW and access roads. • Protection of stockpiles of friable material subject to wind erosion with a barrier, windscreen or vegetation. • Cover loads of friable material during transportation. • Restrict speed on loose surface roads to 25 km/h during dry or dusty conditions. • Enforce vehicle load restrictions to avoid excess emissions from engine overloading. • Where practical, turn off engines when not in use. • Prohibit uncontrolled burning of woody and plant debris within the ROW. • Restrict construction and maintenance activities to daylight hours. • Maintain machinery and vehicles in order to minimise noise and gas discharge. Undertake	Throughout the ROW, especially near communities	Minor	T3, T4, T12 and others	Contractors, supervised by PMU's Environmental committee	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				regular inspections to confirm that appropriate maintenance is performed. • Limit construction to a period as short as possible. • Provide workers in the vicinity of loud noise with earplugs and limit their working time according to national guidelines.					
Natural habitats and wildlife (including special status species)	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • ROW clearance and maintenance • Erection of towers • Physical presence of infrastructures • Disturbance from electric/magnetic field surrounding high voltage installations • Periodic presence of workers • Access to wildlife and protected areas facilitated by access roads • Spills of chemical products or fuel used for preconstruction, construction and maintenance works • Disposal of waste from construction, operation and maintenance works	• Modification of migratory corridors for birds and terrestrial wildlife • Collision and electrocution risks for birds because of the presence of power lines and towers • Degradation of natural habitats and/or species • Disturbance of fauna (including special status species) • Increased poaching due to new access for local people and workers	• Minimize vegetation clearing. • Adjust tower location and span length to minimize the need for tree removal and trimming along forest edges. • Sagging in wildlife corridor should not be less than 10 meters • Mixing of constructed material should be restricted in sensitive ecological areas including corridors and dispersal areas(brought material only prepared from outside) • Camouflage towers/blend to environment (combat like) in corridors to reduce reflection to migrating animals • Avoid construction of the transmission line through wetlands and span wetlands whenever possible. • Where it is not possible to completely avoid wetlands, the use of mats and wide-track vehicles when crossing wetlands is preferable. • Raise awareness on bird conservation and enforce relevant rules and regulations. • Carry out activities during the dry season to minimize disturbance of sensitive soils and problems in flood prone areas. • Use existing roads for construction and operational access whenever possible. • Regular control of vehicles to prevent introduction of invasive species. • Carefully clean construction equipment after working in areas infested with known invasive exotic species. • Favour mechanical maintenance techniques in ROW rather than the use of pesticides.	Other mitigation measures throughout the ROW Specific mitigation measures for bullet No. 3,4& 5 to be implemented at Tanganyet corridor 3km; Mswakini corridor 2.5km; Jangwani corridor 3.5km; Swagaswaga-Barangida Gendawari corridor 5kms	Vegetation: minor Fish and aquatic life: minor Terrestrial fauna: minor Birds: minor Endangered, threatened and protected species: lesser flamingo, elephants	T3, T4, T5, T6, T7	Contractors, supervised by PMU's TANESCO Environmental Unit AfDB to finance wildlife centre and monitoring	As part of works to be executed by the contractors Wetland restoration 50 000 $ +60 000 $ during construction Survey of endangered species / monitoring of migration corridor use by birds and large mammals, including awareness raising. Law enforceme

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				• Allow tree and shrub species with limited heights of 5m to grow within the ROW. • Clearly mark the extent of clearing within the approved worksite areas with pegs at 50 m intervals or less. Identify and mark individual trees for retention along a section within the marked extent of clearing. • Inspect and approve all correctly located pegged clearing sites. Vegetation clearance shall only be undertaken once consent has been obtained from each owner. • Trees along the ROW should be protected from machinery. • Identify/monitor wildlife corridor changes to reduce human wildlife conflicts • Rehabilitate ancillary sites as soon as they are not requested anymore, such as borrow pits, camp sites, material storage piles, etc. • Restore sites to their previous state. • Progressively sow all disturbed construction and ancillary site surface with a cover crop mix immediately following final use of each ancillary site. • In wetlands, staging areas, and/or bird migration corridor, install reflectors on the ground wire at intervals along the line to minimize potential bird collisions. High-risk areas must be identified prior to final project design. • In areas of high bird density, use specially-designed towers so that the conductors of the new line are at the same heights as those of the existing line it parallels. High-risk areas must be identified prior to final project design. • Implement a bird monitoring program in areas where there is a higher risk of bird strike. • Survey of endangered species and monitoring of migration corridor use by large mammals and birds. • Maintain shaded stream areas for aquatic fauna, where possible. • Devise customised measures targeting specific species and/or habitats, if needed. • Inform workers about the regulations related to					nt and identification of high risk areas for bird collisions 200 000 $ During detail design and construction Support establishment of World elephant centre 500,000 U$ - during construction Telemetry/ Elephant radio collaring 250,000,U$ - During construction

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				wildlife protection and conservation areas. • Minimize the number of access roads to the ROW. When possible, proceed to early closing of access roads nearby wildlife and conservation areas. • Noise should be minimized during construction in order that animals in the neighbouring areas are not chased away and land in the hands of hunters. • Take into account migratory patterns and prevent construction during specific period if identified. • Support establishment elephant centre to ensure reliable data availability on corridors and save orphanage elephant due mothers elect ruction • Prohibit workers from possessing firearms and other hunting and fishing devices. • Prohibit wildlife disturbance and poaching. • Support on telemetry elephant collaring to ensure specific areas of routes					
Land occupation	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • Physical presence of infrastructures • ROW clearance and maintenance works	• Loss of arable land • Loss of land for husbandry and grazing • Loss of crops and trees • Disruption of farming activities by operation and maintenance works • Displacement of households, houses and community buildings • Loss and impinging corridors and degradation of wildlife habitat	• Final survey of all affected assets to update the RAP cost estimates prior to payment of entitlements. • Appropriate valuation of the affected properties should be done both by the property owner and the PIU. • Based on the valuation reports, provide appropriate compensation before construction is initiated and allow sufficient time for the affected households to transfer or reconstruct structures. • Complete all necessary land and building acquisition in accordance with RAP prior to commencement of any construction works. • Encourage the practice of compatible agricultural activities within the ROW. • Plan maintenance works outside of the growing and grazing season. • Provide compensation of a year of harvesting of the area under cultivation in the ROW to all affected households. In addition, crops that may be removed from land to be temporarily used for	Throughout the ROW	Houses and secondary structures: medium Community buildings: minor	T8, T9, T10, T11	Contractors, supervised by PMU's TANESCO Environmental Unit Local Government and PIU	As part of works to be executed by the contractors See RAP report for compensation costs

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				construction purposes (camps, access roads) will have to be compensated on the same basis (cash equivalent to a year of harvesting). • If soil compaction has occurred, chisel plough the affected soil over successive seasons as needed to break up compaction layers. • Remove all construction debris and leftovers at the end of construction of each portion of the line. • In order to reduce the impact of the project on land and agricultural production, restrict permanent acquisition of land for the ROW (except for the towers) and favour leasing with restrictions on cultivation practices (forbid trees with potential to grow beyond 5 m at maturity). • In collaboration with District Council Revisit land use plan in villages with ecological sensitive area					Update Land use plan 300,000U$
Community forests	Preconstruction Construction Operational Maintenance Decommissioning	• ROW clearance and maintenance works • Periodic presence of operation and maintenance workers	• Loss of community forest areas • Disturbance of fauna • Increased poaching due to new access for local people and workers • Degradation of subsistence and income-generating activities related to community forests	• Engagement of affected communities in the planning of construction and maintenance activities in order to mitigate impacts on forests' resources. • Reforestation program to compensate for community forest losses. This program should involve the local population as much as possible in collaboration with the Tanzania Forest Service. In addition, local plant species should be used for reforestation.	Mogithu, Mara, Bagara, Kinyagigi, Mwada, Sigino, Kiongozi, Mawemairo, Meseranijuu, Vilima vitatu, Kimokowa, Nangwa and Minjingu	Minor	T3, T4, T5	Local government Community engagement: Contractors, PMU's Environmental Unit TANESCO TANESCO to finance	Reforestation program : : 50 000 $) during Construction stage Ant poaching program: 60 000$ During construction stage
Infrastructure	Preconstruction Construction Maintenance Decommissioning	• Circulation of vehicles to and from construction sites	• Degradation of existing roads • Traffic disturbances during construction activities • Pressure on the existing resources • Construction of Arusha substation and 5km access road	• In order to minimize inconvenience to road users, the Contractor should be required to implement measures to keep all roads and accesses affected by the work open and not to obstruct traffic flows and existing accesses at all times. • Compliance with all relevant applicable laws related to transportation. • Regular inspection of access road conditions; traffic-related construction damage to be repaired as soon as practical. • Installation of electric cables over roads should be done during non-peak traffic times to reduce	Throughout the ROW	Minor	T3, T4	Contractors, PMU's TANESCO Environmental section TANESCO AfDB Local government	Cost to be covered by Contractor

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				impacts on pedestrians, cyclists and cars. • Planning construction activities should be done in collaboration with local authorities and well in advance to ensure minimal traffic interference. To this end, TANESCO will be responsible for strictly enforcing construction schedules. • Conduct an inventory of all services that will be disrupted during construction. • Liaise and reach agreement with affected landowners, local authorities, public undertakings and local people regarding services to be maintained, temporarily cut and reinstated, including the timing and location of cuts and reinstatements. • Obtain written permission from affected landowners and local people regarding the temporary cessation of services. • Maintain or provide temporary services during construction, including temporary water supplies. • Progressively reinstate or repair all interrupted services to their previous capacity. • Involvement of local population in reconstruction. • Upgrading of 5km access road • Construction of elephant world centre • Telemetry monitoring • Construction of dispensary, upgrading of primary school, construction of village government office at Lemugur village					
Cultural Properties	Preconstruction Construction Maintenance Decommissioning	• Construction of access roads and tower foundations • Tower erection • ROW clearance and maintenance works	• Partial destruction of non-identified paleontological/archaeological sites and/or historical buildings and sites	• Should any archaeological or historic remnants be encountered, construction work should immediately stop along that section, and the relevant authorities should be informed. Any archaeological findings should be reported to the national museum authorities. • Affected cultural sites should be properly compensated and/or relocated in accordance with customs and norms of the communities. • Further investigation about actual locations and ceremonies associated with graves, shrines and other properties should be carried out before project implementation.	Throughout the ROW	Minor	T3, T4	Contractors, supervised by PMU's Environmental committee and PIU Supervision by LGA's Antiquity department	As part of works to be executed by the contractors Archaeological monitoring 30,000U$
Economic	Preconstruc	• Construction of access	• Lose or gain business	• The Contractor should investigate local, regional	Throughout	Arable		Contractors,	As part of

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
activities	tion Construction Operational Maintenance Decommissioning	roads and tower foundations • Erection of towers • ROW clearance and maintenance works • Physical presence of infrastructures	opportunities near camp sites • Temporary or permanent loss of income generating activities • Temporary or permanent damage to structures generating income activities • Temporary or permanent loss of access to income generating resources • Potential resettlement away from actual activities, structures and or income generating resources	and national capacity to supply construction materials, goods and services, whenever goods or services are available on a competitive basis, the policy should be to purchase locally. • Adopt procurement policies promoting local products and services, when available. • Final survey of all affected assets to update the RAP cost estimates prior to payment of entitlements. • Based on the valuation reports, provide appropriate compensation before construction is initiated and allow sufficient time for the affected households to transfer or reconstruct structures. • Complete all necessary land and building acquisition in accordance with RAP prior to commencement of any construction works. • Encourage the practice of compatible agricultural activities within the ROW. • Plan maintenance works outside of the growing and grazing season. • Provide compensation of a year of harvesting of the area under cultivation in the ROW to all affected households. In addition, crops that may be removed from land to be temporarily used for construction purposes (camps, access roads) will have to be compensated on the same basis (cash equivalent to a year of harvesting). • If soil compaction has occurred, chisel plough the affected soil over successive seasons as needed to break up compaction layers. • Remove all construction debris and leftovers at the end of construction of each portion of the line. • In order to reduce the impact of the project on land and agricultural production, restrict permanent acquisition of land for the ROW (except for the towers) and favour leasing with restrictions on cultivation practices (forbid trees with potential to grow beyond 5 m at maturity).	the ROW	Land and farming activities: medium Other economic activities: minor	T3, T4	supervised by PMU's Environmental committee and PIU	works to be executed by the contractors See RAP report for compensation costs
Employment	Preconstruction Construction	• Construction of access roads and tower foundations • ROW clearance and	• Limited number of new job opportunities	• Adopt human resources policies favouring local labour. The Contractor should develop and implement a plan to ensure that local residents are given first priority for job opportunities for which they are qualified, before workers from	Throughout the ROW	Medium (positive)	T3, T4	Contractors, supervised by PMU's Environmental committee	As part of works to be executed by the

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
	Operational Maintenance Decommissioning	maintenance works		outside the region are hired. Details of specific job opportunities must be released and information provided on application procedures. • Women should be part of the hired local population. • Adopt procurement policies promoting local products and services, when available. • Adopt policies and procedures that comply with national legislation and address all aspects of labour standards relevant to the project as specified by IFC policies. Sub-contractors will be contractually required to comply with labour and health and safety regulations. • Form local decision committees composed of members from Maasaï clans along the proposed line route for local employment matters. This approach worked well during the construction of the Athi River-Namanga-Arusha road and it should be replicated during construction of the proposed transmission line.					contractors
Gender, vulnerable and minority groups	Preconstruction Construction Operational Maintenance Decommissioning	• ROW clearance • Interaction of workers with local communities • Uneven access to new job opportunities • Distribution of compensations	• Increased marginality for vulnerable groups • Sexual harassment • Reduce women's access to agricultural land for subsidence and income generating activities • Temporary or permanent loss of subsidence and income generating activities for Maasaï • Increased social tensions	• Develop specific employment programs for women, young, poor, and other vulnerable groups. • Establish culturally adapted grievance mechanisms readily accessible to vulnerable groups. • Meet regularly with local community representatives to discuss any community issues related to the project. • Engage with traditional authorities and vulnerable group's representatives in the elaboration of RAP. • Encourage the practice of compatible subsidence activities within the ROW, with a special emphasis on vulnerable groups. • Prohibit child labour. • Give priority to women for jobs related to cooking and cleaning services at worker camps.	All communities along the ROW	Minor	T4	Contractors PMU's Environmental committee	As part of works to be executed by the contractors

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
Health and safety	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • ROW clearance and maintenance works • Increased traffic • Presence of workers • Physical presence of infrastructures	• HIV/AIDS propagation • Higher prevalence of vehicle accidents • Injured PAPs near or on the worksite • Accidents on worksites • Risk of electrocution caused by equipment breakdowns, illegal connections and all other forms of unsafe contacts	• Educate local population on hazards and safe practices when playing and working near high voltage power lines. • Provide safety equipment to workers. • Install warning signs and anti-climbing devices near construction sites and towers. • Erect an appropriate number of lighting arrestors. • Ensure the development of local and regional emergency plans and local major break in case of infrastructure breakdowns, especially near roads or residential areas. • Monitor and control illegal connections. • Devise and implement HIV/AIDS prevention programme. • Support increase of medical kits to dispensaries along the RoW • Organise environmental and safety training for employees. • Preparation of a health and safety plan for workers and impacted communities. • Education and sensitisation of workers and communities on STDs including HIV/AIDS and the dangers associated with construction activities. • Prohibit child labour. • Contractor and sub-contractor should use appropriate vehicles and comply with legal gross vehicles and axle load limits. • Contractor and sub-contractors should minimize road safety hazard and inconvenience to other road users by taking all appropriate measures. • Design and construct the transmission line in compliance to EMF levels set for occupational and human health exposure. • Minimize exposure of the general public to EMF by forbidding construction of business, educational or residential building structures in the ROW. • Incorporate ground wire on top of the line during design to protect the transmission line from lightning strikes by directing lightning ions safely to ground. Lightning is therefore not more likely to strike houses or vehicles close to the	Throughout the ROW, camp sites, all communities along the ROW	Minor	T4, T13	TANESCO Local Government Contractors (safety equipments)	As part of the promoters' mandate Medical support 250,000,U$

Valued environmental and social component	Phase	Source of impacts	Potential impacts	Optimization, mitigation and compensation measures	Location	Magnitude of residual impact	Compliance with national regulation[1]	Responsibility	Budget (USD)
				transmission line. Shorter objects under or very near the line may actually receive some protection from lightning. • Forbid members of the public from construction areas. • Provide emergency fire assembly points at strategic locations, clearly marked. • Enforcement of maximum load restrictions. • Enforcement of speed limits. • Compliance with all relevant applicable laws related to transportation. • Support medical kits to dispensaries within way leave					
Landscape	Preconstruction Construction Operational Maintenance Decommissioning	• Construction of access roads and tower foundations • Erection of towers • ROW clearance and maintenance works • Physical presence of infrastructures • Aesthetic of technical design	• Permanent alteration to the landscape • Potential degradation of highly sensitive scenic areas and tourism attractions	• Integration of potential impact on landscape as a key variable in the definition of the corridor route. – Where possible, straight lines are maximized in order that the need for angle towers, which have a more negative visual impact due to their heavier construction, is minimized. – Where feasible, the transmission line route is positioned immediately adjacent to the existing 132 kV line, limiting the visual impact to an already disturbed area. • Wayleave management can also mitigate aesthetic impacts by planting vegetation screens to block views of the line, leaving the wayleave in a natural state and providing wildlife habitats. • Landscaping all disturbed areas, restoration of all temporary construction work areas. • Existing tracks will be used for construction and maintenance as much as possible.	Throughout the ROW, mainly near tourism attractions	Minor	T3, T4	PMU's Technical committee (corridor's route) Contractors, supervised by PMU's Environmental committee	As part of works to be executed by the contractors

Note:

T1 - Electricity Act, 2008
T2 - Rural Energy Act, 2005
T3 - Environmental Management Act, 2004
T4 - Environmental Impact Assessment and Audit Regulations, 2005
T5 - Forest Act (2002)
T6 - Wildlife Conservation Act (1974)
T7 - Water Resources Management Act, 2009
T8 - Land Act, 1999
T9 - Village Land Act No. 5 of 1999
T10 - The Land Regulation (2001)
T11 - The Land Disputes Courts Act No. 2 of 2002
T12 - Legal Provisions on Pollution
T13 - The Occupational Health and Safety Act (2003)
T14 - Disclosure Requirements

In addition to Table 7.1, the Contractor should prepare and implement the following plans

- Drainage and erosion control plan;
- Rehabilitation plan for disturbed areas;
- Waste management plan;
- Intervention plan for contaminants accidental spills;
- Fuel and other hazardous materials management plan;
- HIV/AIDS awareness and prevention program;
- Health and safety plan.

CHAPTER SEVEN

7.0 Environmental Costs and Benefits

Environmental costs and benefits refer to the indirect valuable consequences, or externalities, generated by a given activity. It is widely recognized that such externalities must be considered in all project's global costs and benefits analysis. Indeed, the prerogatives of sustainability imply that environmental costs should be minimized, fairly distributed and trumped by the long-term benefits. In this context, an environmental costs and benefits analysis for the project is conducted as part of the ESMP.

Environmental costs for this project shall comprise the compensations established under the RAP (see separate report), plus a financial evaluation of non-compensated damages and disturbances bore by the receiving natural and socioeconomic systems. Compensations concern households and communities directly affected by the transmission line route and are estimated so far at a total amount of 10.77 MUSD. Non-compensated residual impacts are anticipated to variable extents (punctual to regional) and, although their value cannot be established at this stage, they are for the most part expected to be of minor magnitude (Table 27).

As for the project's environmental benefits, these concern mainly the new employment and local business opportunities during the preconstruction and construction phases. The magnitude of these economic benefits for nearby communities is expected to be medium, although temporary, but has yet to be quantified in more accurate terms.

It is also hoped that a few communities located in or adjacent to the corridor's route will benefit from electrification from the new power line. This would translate into considerable and permanent improvements to livelihood and quality of life in beneficiary communities. In the technical feasibility study (RSWI, 2012). the possibilities of electrifying unconnected communities have been studied. Extension of existing 33kV line will be constructed to interconnect the villages along the proposed 400kV TL. .

The improved power trade in the region also represents environmental benefits in terms of climate change mitigation. Indeed, importing the excess of electricity produced in Tanzania can help reduce GHG emissions in Kenya. Besides producing electricity, importation is one of the ways Kenya will have access to the needed power for its development, as proposed in the Least Cost Power Development Plan (Republic of Kenya, 2011). In fact, as shown in the Feasibility study (RSWI, 2012), Kenya would have to produce 2 320 MW of electricity mainly through coal fuel plants (52% or 1 200 MW) and geothermal (48% or 1 120 MW) to meet its power demand for the period commencing from 2014 to 2031. The construction and operation of these plants would produce, especially in the case of coal power plants, a large amount of greenhouse gas (coal produces 955 g of CO_2 per kWh (Rybach, 2010)).

Improved access to electricity for both countries will also reduce the use of firewood for cooking and heating, which represents a significant source of deforestration, contributing to climate change. In addition, access to electricity can reduce the use of private generators and kerosene lamps, which also produce GHG emissions. Overall, the project's social and environmental residual costs are considered to be outweighed by potential benefits to affected communities.

7.1 Institutional Arrangement for ESMP Implementation

Responsibility for proper implementation of the ESMP belongs to the Promoters, *i.e.* TANESCO in Tanzania in some case jointly with KETRACO. In close collaboration with concerned ministerial authorities, promoters will undertake the creation of a PMU and of an independent PIU. Figure 7.1 shows the institutional arrangements proposed for the ESMP implementation.

7.1.1 Project Management Unit (PMU)

TANESCO in Tanzania will coordinate the establishment of a PMU, composed of a Technical Committee and of an Environmental Committee. The Technical Committee shall be composed of technical experts able to monitor compliance with specific construction requirements included in tenders and contracts. The Environmental Committee will be provided with experts from the fields of environment, ecology, agronomy and sociology and will ensure the adequate implementation of planned environmental and social management measures. These experts may originate from the Promoter's professional staff, from concerned ministerial authorities (including NEMC) or be provided by private consulting firms.

The Environmental Committee will supervise the implementation of the required environmental measures by the Chief Contractor and its sub-contractors in charge of construction works. Furthermore, this Committee will closely cooperate with the PIU in the estimation and delivery of compensations to affected households and in the implementation of the Compensation Community Fund, as discussed in the RAP.

Should an incident which has the potential to cause serious environmental or material harm occur, the Environmental Committee must be authorised to stop works or issue instructions to the Chief Contractor (or Sub-contractors) to ensure that the impacts are minimized or eliminated.

7.1.2 Project Implementation Unit (PIU)

As expressed during the public consultations (Chapter 4), some households and village leaders fear that they will not benefit from fair compensations. In order to warrant independent oversight of the evaluation and implementation of compensations, as well as the fulfilment of environmental and social measures, it is recommended that a PIU be created for the project time frame. Members of this Unit must be independent from the Promoter and from ministerial authorities in order to ensure its neutrality in the monitoring of ESMP and RAP implementation.

Moreover, it is recommended that the coordination of PIU be executed by a neutral person coming from a credible NGO or private consulting firm. The PIU is also responsible for receiving complaints from affected households and communities and assuring a liaison with PMU board and committees. In addition, the PIU periodically reports to government agencies and donors on its assessment of compliance with environmental standards and required management measures, as well as on its evaluation of the social, economic and environmental general conditions of affected communities and households. The responsibilities of the PIU in the preparation, implementation and monitoring of the detailed RAP are presented in the separate RAP.

7.1.3 Contractors

The Chief Contractor will designate an appropriately qualified Site Environmental Officer (SEO) who, upon approval by the respective PMU's Environmental Committees, will be implementing the day-to-day on-site management and monitoring measures set out in the ESMP. The SEO will regularly report to PMU's Environmental Committee throughout the duration of works.

Designated liaison Officers, under the supervision of the SEO, shall be responsible for monitoring the compliance of work performed by sub-contractors with respect to health, safety and environmental issues. All national regulations in terms of health, safety and environment, as well as TANESCO corporate standards, should be respected. In the absence of precise rules, it is suggested to use, when relevant, the WHO and/or World Bank standards. Contractors shall possess all required permits and licenses prior to the beginning of works.

7.2 Training Needs

In relation to the above, training and communications are important issues in order to raise the knowledge and understanding of current environmental legislation and on the many issues related to compensation and regulations governing the project. For instance, experience gained from built power lines indicate that people still erect structures and buildings within the wayleave. Thus, continuous education and awareness rising are necessary to avoid accidents and enhance safety.

A training program must be implemented as part of the ESMP to enhance environmental awareness among key personnel involved with the construction and operation of the transmission line. Staff directly engaged in the assessment and monitoring of environmental conditions will be given additional specialized training.

Training on Environmental, Health, Safety and Quality Standards are to be provided for all of the project stakeholders.

Table 7.2 outlines the proposed training for TANESCO staff as well as for the Contractor employees. The training is focussed on the practical aspects of environmental monitoring and management.

Table 28: Training Programme

Training Recipients	Type of Training	Environmental Issues to be Covered	Training Conducting Agency
TANESCO Environmental Staff	• Lecture • System • Workshops • Group • Case studies • On-site	• Environment overview • Environment regulations and acts • Environmental management plans • Environmentally sound construction management	Environmental social experts and NEMC
TANESCO Operation/Maintenance Staff	• Seminars • Workshops • Lectures • Case studies	• Environmental Management Plan implementation • Environmental pollution associated with transmission projects • Best environmental practices	Environmental social experts and NEMC
Contractors' Staff	• Seminars • Workshops • Lectures • On-site	• Environmental overview • Best on-site environmental practices • Environment regulations and acts • Environmental management plans • Environmental pollution associated with power transmission projects • Power transmission projects and environmental issues	Environmental social experts and NEMC

7.3 Institutional Capacity Building

The proposed ESMP is based on a collaborative approach where the responsibility for the implementation and monitoring of the environmental and social management measures is shared between many stakeholders, although to varying degrees. Concerned authorities and actors have their own specific expertise but do not always make the relationship between their activities and all cross-cutting themes of environmental and social management. In this context, the successful implementation of the ESMP will rely on a program of institutional

assistance and capacity building that revolves around the following points:

- Educate and train the chain of project participants (from ministerial staff to contractors and workers) on the ESMP implementation and monitoring procedures and their rationale;
- Through PMU and its technical and environmental committees, foster enhanced engagement of Promoters and concerned ministerial services in multidisciplinary planning and consultation meetings;
- Through PIU and participating NGOs, foster enhanced engagement of civil society organizations in the project design, monitoring and continuous adjustments.

CHAPTER EIGHT

8.0 Monitoring Requirements

Environmental and social monitoring is an essential component of the ESMP. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measure. It also helps anticipating possible environmental hazards and/or detecting unpredicted impacts over time. Monitoring includes:

- Visual observations;
- Selection of environmental parameters at specific locations;
- Sampling and regular testing of these parameters.

Monitoring efforts take place at different scales (on-site, in nearby communities or at a regional level) and require the cooperation of many participants. Essentially, monitoring shall provide continuous and viable information on the actual changes occurring in natural and socioeconomic systems engendered by the project, as well as on the degree of fulfilment of planned management and compensation measures. Throughout the project cycle, monitoring results will allow for ongoing evaluation and improvement of the relevance and effectiveness of the projected environmental and social measures, thus contributing in an important manner to the project's sustainability.

Monitoring plans to be implemented as part of the project are listed in Table 7.3 along with the parameters, location, frequency as well as the designated monitoring responsible party. It should be noted that baseline studies will have to be undertaken during the detailed study, prior to construction activities. Baseline data collected before construction will consent to comparison with data collected during monitoring activities.

Table 29: Monitoring Plans

Component	Project stage	Parameter	Standards / targets	Location	Frequency	Responsibility	Supervision
Surface water quality	Preconstruction Construction	pH, TSS, turbidity, phosphorus, BOD, coliform bacteria, temperature increase, visual observations (oil, litter, etc.)	No significant degradation of baseline conditions	Selected sites along rivers and streams crossed by the ROW Selected sites downstream of construction camps	Monthly – one year before project starts until one year upon completion of construction activities	PMU's Environmental committee	PIU
Drinking water quality	Preconstruction Construction Operation	pH, heavy metals, cyanides, ammonia, chlorine, phenols, coliform bacteria	World Health Organisation and national standards	Preconstruction and construction: camp sites and community intakes located nearby work areas Operation: community intakes located nearby substations	Preconstruction and construction: Weekly Operation: Annually	Contractor / operator	PMU's Environmental committee and PIU
Air quality	Preconstruction Construction	Visual inspection of construction sites and access roads	No significant degradation of baseline conditions	Along ROW, access roads and work areas	Continuous during preconstruction and construction activities;	Contractor's SEO	PMU's Environmental committee
Noise Levels	Preconstruction Construction	Noise levels (dBA)	World Bank and national standards	All communities and cluster of houses within 500 m of ROW	Periodic sampling, to be determined by the contractor's SEO	Contractor's SEO	PMU's Environmental committee
Soil Erosion	Preconstruction Construction Operation	Visual inspection of construction sites and access roads	USEPA guidelines	Along ROW, access roads and work areas	Continuous during preconstruction and construction activities; Annual monitoring throughout operation	Contractor's SEO	PMU's Environmental committee
Evolution of fauna and wetlands	First two years of operation	Wildlife species present in ROW and wetland surface areas	No significant degradation of baseline conditions	Targeted areas	To be determined	PMU's Environmental committee TANAPA Wildlife Department; World elephant center	PIU
Bird strikes monitoring program	First two years of operation	Bird mortality rate due to collision / electrification	n.a.	Targeted areas (higher risk of bird strike)	To be determined	PMU's Environmental committee Wildlife division World Elephant centre	PIU
Communities' health	Preconstruction Construction Operation Maintenance	HIV / AIDS occurrence in local population	No propagation caused by the project	Communities in interaction with workers	Annually	Health authorities	PIU
		Number of accidents / injuries related to the project	No accident / injuries in local population	Communities along ROW	Monthly during construction; annually during operation	PMU's Environmental committee	PIU

Component	Project stage	Parameter	Standards / targets	Location	Frequency	Responsibility	Supervision
Social and economic benefits for local communities	Preconstruction Construction Operation Maintenance	Number of jobs created in local communities Local authorities' general perception of project	Most of low skill workers are recruited locally General perception of project is positive Number of communities connected	Communities along ROW	Annually	PMU's Environmental committee	PIU
Overall implementation of mitigation, optimization and compensation measures	Preconstruction Construction Operation Maintenance	-	Full implementation of ESMP	-	-	PMU's Environmental committee	PIU

8.1 ESMP Implementation Budget and Schedule

A budget estimate for ESMP implementation and monitoring is provided in Table 30 whereas an implementation schedule is proposed in Table 31. Budgetary requirements were estimated according to the Standards on Designing, Planning and Computing Construction Costs for a transmission line, while taking into consideration the experiences of similar projects already in operation and the scope and nature of management measures adopted for this project. Please take note that relocation and compensation costs are considered in the distinct RAP report.

Table 30: ESMP Implementation Budget (USD)

Item	Kenya costs (USD)	Tanzania costs (USD)	Total costs (USD)
Training programme	100 000	100 000	200 000
Wetland restoration	0	50 000	50 000
Survey of endangered species and monitoring of migration corridor use by birds and large mammals, including identification of high risk areas for bird collisions	50 000	200 000	250 000
Reflectors	20 000	60 000	80 000
Health & Safety including HIV/AIDS prevention program and support medicine kits	50 000	250 000	300 000
Reforestation program	0	50 000	50 000
Avifauna and wildlife corridor monitoring(elephant centre & telemetry monitoring		400,000	*400 000
ESMP monitoring plans	75 000	390 000	465 000
Annual environmental audit by TANESCO	82 000	82,000	164 000
5km construction access road to substation		5,000,000	5,000,000
Subtotal	337 000	6,582,000	6,919,000
Inflation costs – 5%	16 850	309,100	345950
TOTAL	**433 850**	**6,891,100**	**7,262,950**

Facilitation contribution shared with other development partners

Table 31: ESMP Implementation Schedule

ACTIVITIES	TIMESCALE (years / months)																																							
	Year 1												Year 2												Year 3																
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12				
Preconstruction phase																																								
Setting-up of PMU's Environmental Committee																																								
Setting-up of PIU																																								
Information and outreach to communities and PAPs																																								
Delineation and pegging of ROW																																								
Parcel Inquiry																																								
Definition of compensation standards involving PMU and PIU																																								
Construction phase																																								
ROW clearance																																								
Compensation payments to PAPs																																								
Restoration of income generating assets																																								
Supervision and monitoring of mitigation measures' implementation																																								
Setting-up of CSRF																																								
Operational and maintenance phase																																								
ESMP performance assessment																																								
Livelihood performance test																																								

CHAPTER TEN

10.0 Conclusions and recommendations

Environmental and social impacts were assessed based on a review of available documents, consultations with local, regional and national stakeholders as well as on the results of a detailed socio-economic survey conducted among PAPs. Site verification was done by an independent consultant before reviewing the original document.

I do accord with earlier consultant that the main impacts on the biophysical environment will be felt during the construction phase of the project. These impacts are the permanent loss of vegetation in the ROW and the permanent loss of small portions of wetlands required for the construction of towers. Other impacts, such as dust emissions, noise, soil erosion, degradation of water quality, soil contamination by poor waste management or accidental spill of hydrocarbons, as well as disturbance and displacement of wildlife, may occur during construction and maintenance works but will be very limited and of temporary nature. With the implementation of the proposed mitigation measures, the impacts on the biophysical environment are considered minor. However, the impacts on endangered, threatened and protected species were not assessed given the lack of information about the status of these species in the study area. Additional studies are thus required and should be conducted during the next project phase and prior to preconstruction activities.

The main social impacts are the permanent loss of arable land due to the presence of access roads and tower bases, and the restriction of planting species without the potential to grow beyond 5 m at maturity in the ROW. Another significant impact will be the relocation of houses and some public or private infrastructure such as schools, mosques, churches, shops. In the case of wildlife corridor, electrical wire sagg, all fall may cause a havoc to wildlife using the route through electrocution or collision for birds etc. In the cases of communal infrastructure, these will be relocated on another part of the same land, to an adjacent land plot or elsewhere as may be desired by the affected households. Many social measures have been proposed to minimize or compensate for adverse impacts and to maximize positive impacts. These measures namely include encouraging the practice of compatible agricultural activities within the transmission line ROW and planning maintenance work outside of the growing and grazing season. In the case of sagging specific design in specific areas used according to radio collaring studies, should be adhered and be part in contract agreement.

The new transmission line may also lead to positive opportunities for project affected persons and communities. These opportunities may be presented in the form of temporary employment during the construction phase, as well as through income generated by business opportunities, such as sale of food and other consumables to migrant workers among others. The improvement of existing access roads for construction needs may also

benefit the communities if these roads are well maintained during construction and delivered in a good state at the end.

An Environmental and Social Management Plan (ESMP) has been developed to ensure that mitigation measures are effectively implemented during the construction and operational phases of the project. Monitoring plans are proposed for surface water quality, drinking water quality, air quality, noise levels, soil erosion, evolution of fauna and wetlands, bird strike mortalities, communities' health, social and economic benefits for local communities. The ESMP also provides orientations on training and capacity building requirements for its successful implementation.

The project is feasible for implementation with medium impacts which can be mitigated for the local livelihood, national and global development improvement thus met the poverty alleviation global goal. Finally, its recommended that the prepared ESMP should be part and parcel of the contractor's contract agreement.

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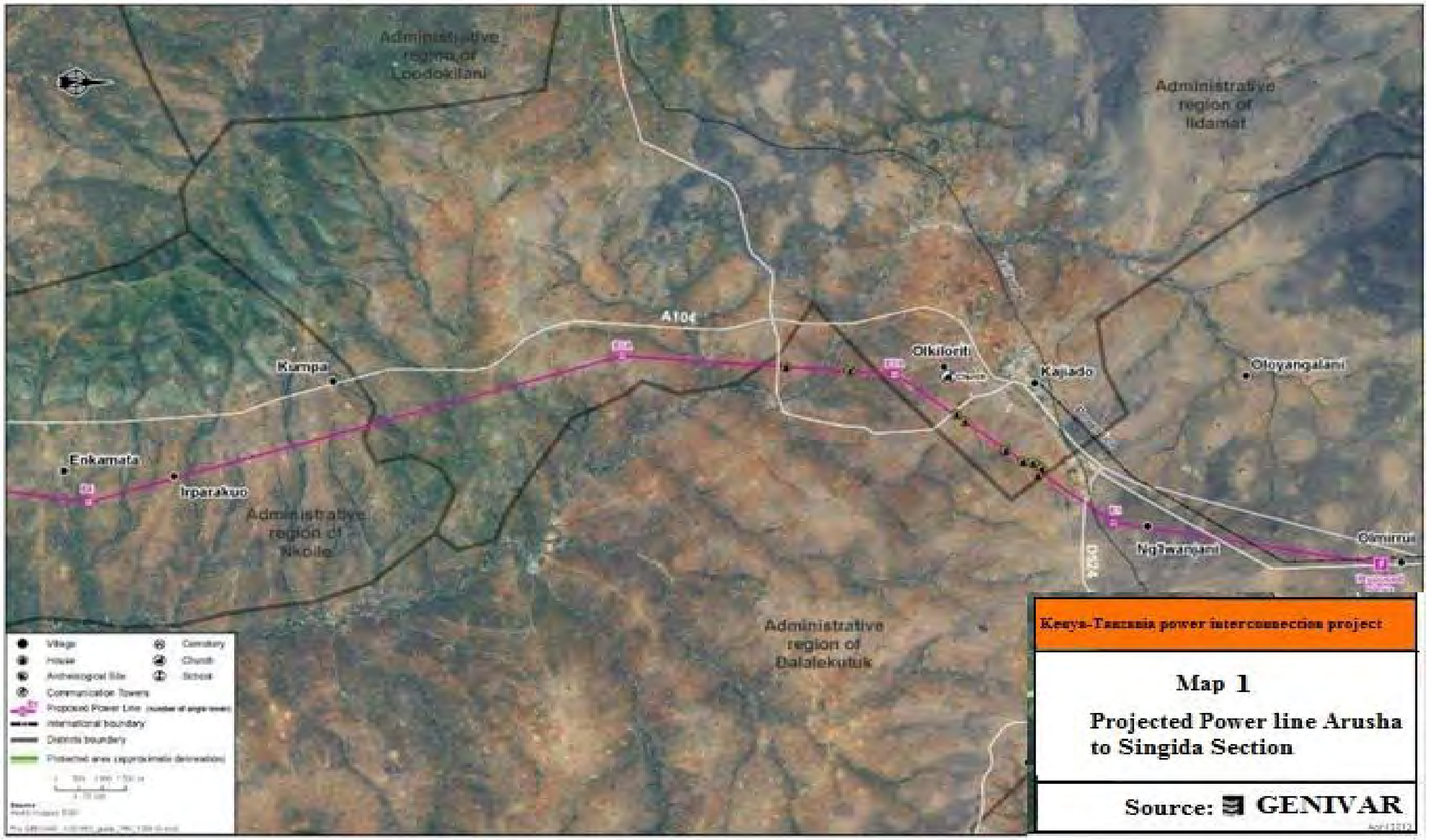
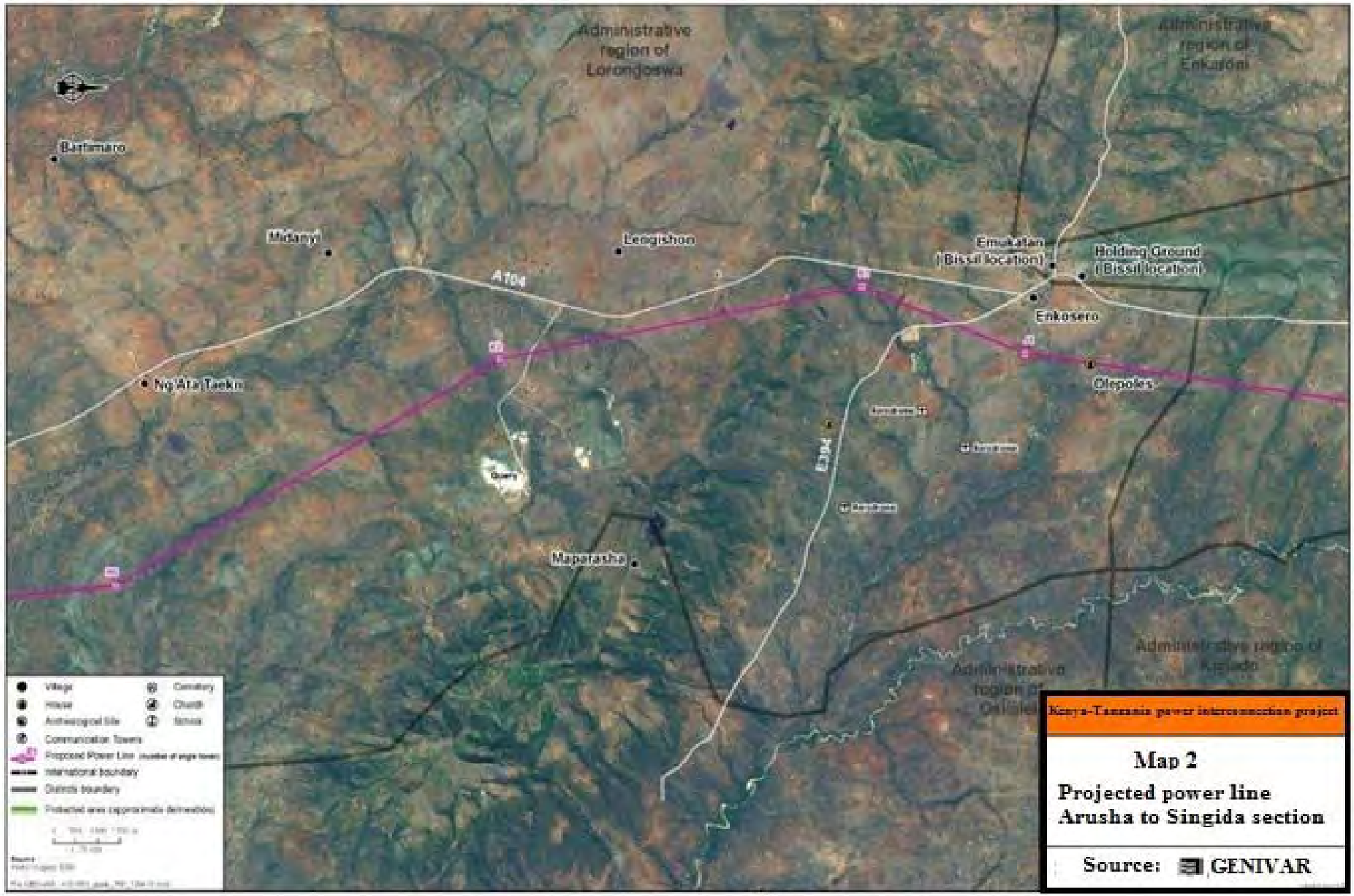
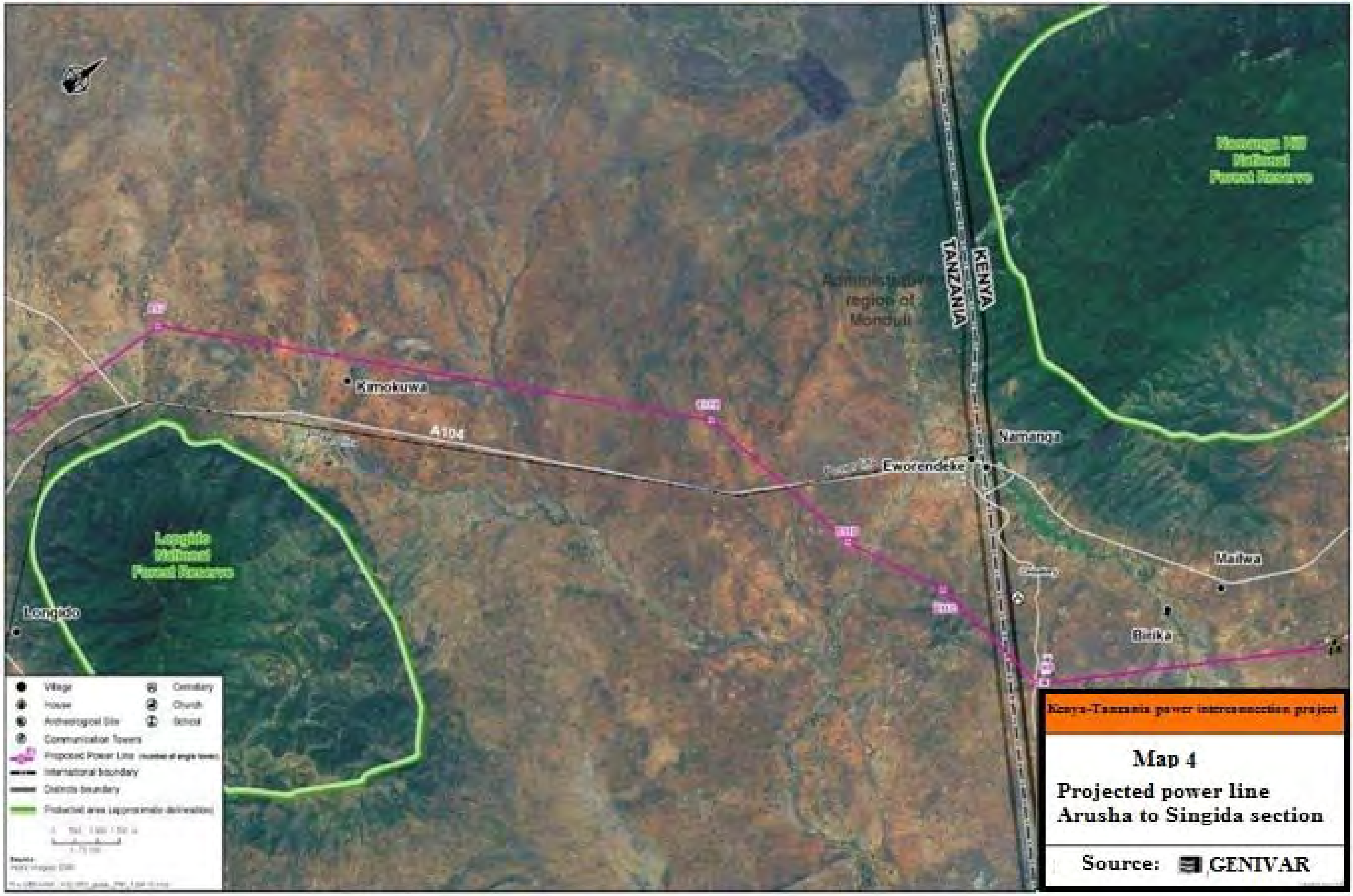
LIST OF APPENDICES

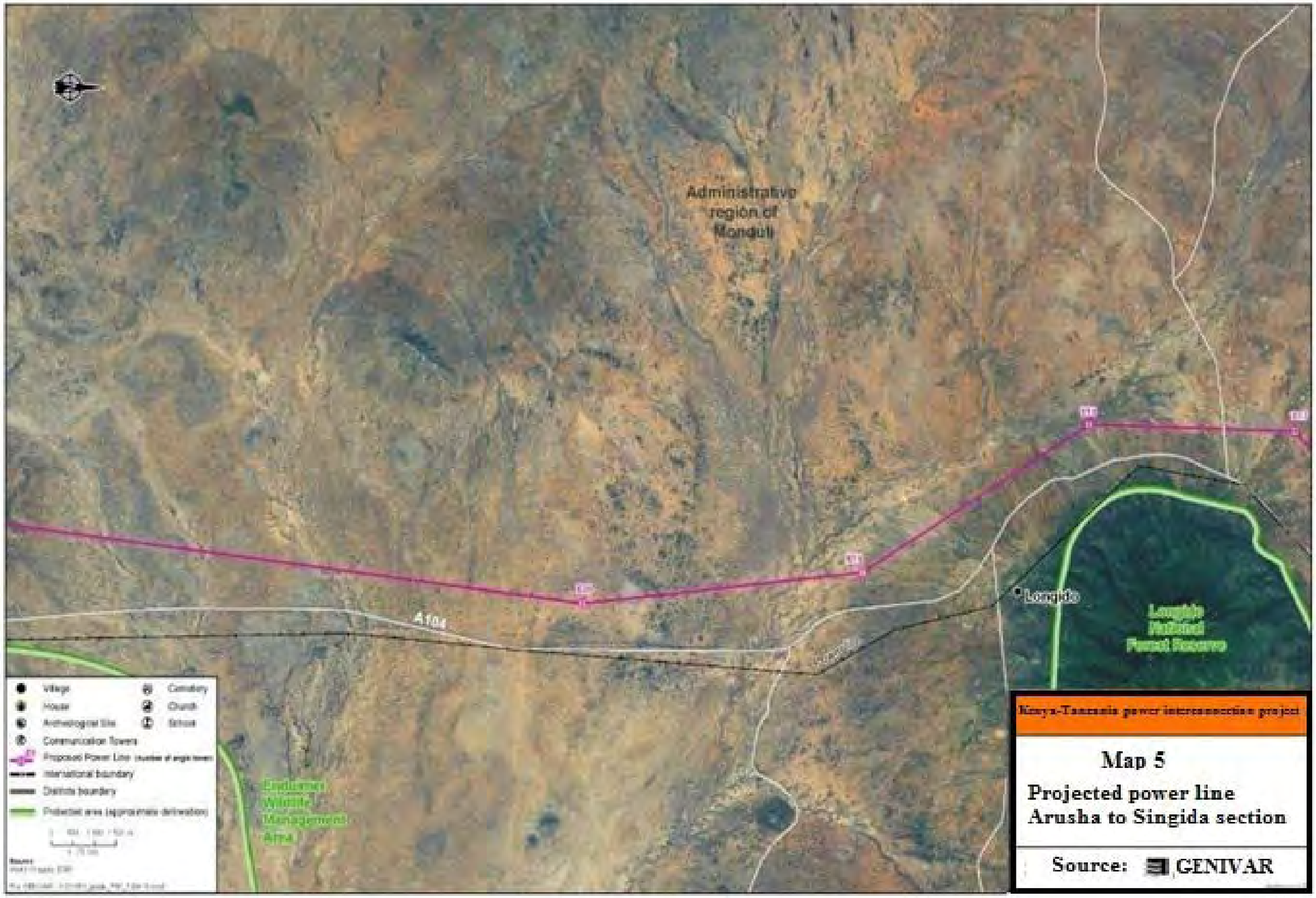
APPENDIX 1 Maps of Transmission Line Corridor




Administrative region of Loronjoswa
Administrative region of Enkaroni
Bartamaro
Midanyi
Lengishon
A104
Emukatan (Bissil location)
Holding Ground (Bissil location)
Enkosero
Olepolos
Ng'Ata Taeka
Quarry
E394
Maparasha
Administrative region of Kiteto
Village
House
Archaeological Site
Communication Towers
Proposed Power Line
International boundary
Districts boundary
Protected area (approximate delineation)
Cemetery
Church
School
Kenya-Tanzania power interconnection project
Map 2
Projected power line
Arusha to Singida section
Source: GENIVAR


Administrative region of Monduli
TANZANIA
KENYA
Administrative region of Namanga
Administrative region of Lorongoswa
Eworendeke
Namanga
Inkati
Ntinyika
Birika
Mailwa
Ntirkishi
Orng'Arua
Lianai
Ndialong'Or
Ngatataek
A104
Administrative region of Namanga
Village
Cemetery
Church
Archeological Site
School
Communication Towers
Proposed Power Line
International boundary
Districts boundary
Protected area (approximate delineation)
Kenya-Tanzania power interconnection project
Map 3
Projected power line Arusha to Singida section
Source: GENIVAR

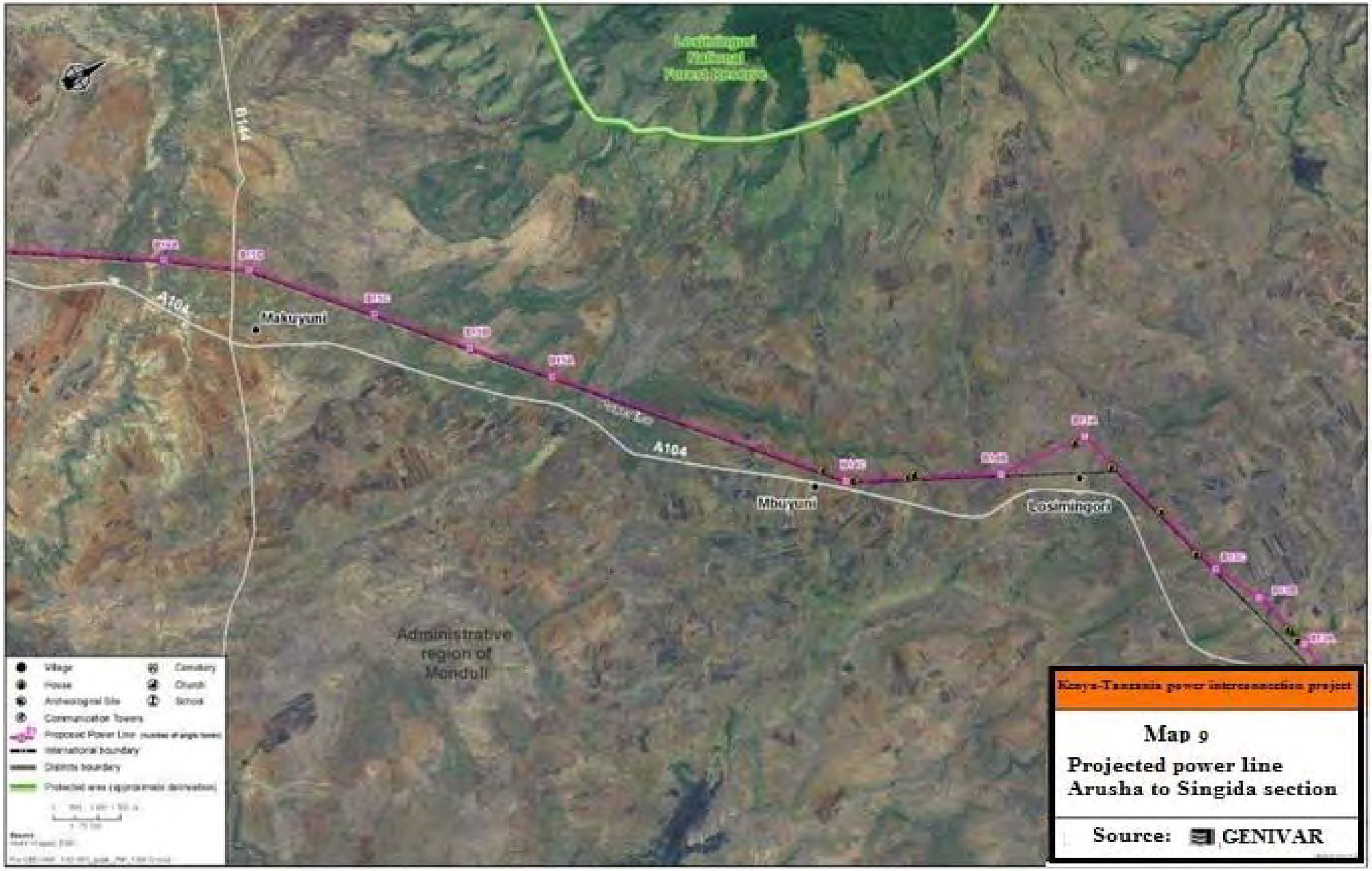

KENYA
TANZANIA
Administrative region of Monduli
Kamokuwa
A104
Namanga
Eworendeke
Maiwa
Birika
Longido
Village
House
Cemetery
Church
School
Communication Towers
Proposed Power Line
International boundary
Districts boundary
Protected area (approximate delineation)
Kenya-Tanzania power interconnection project
Map 4
Projected power line
Arusha to Singida section
Source: GENIVAR

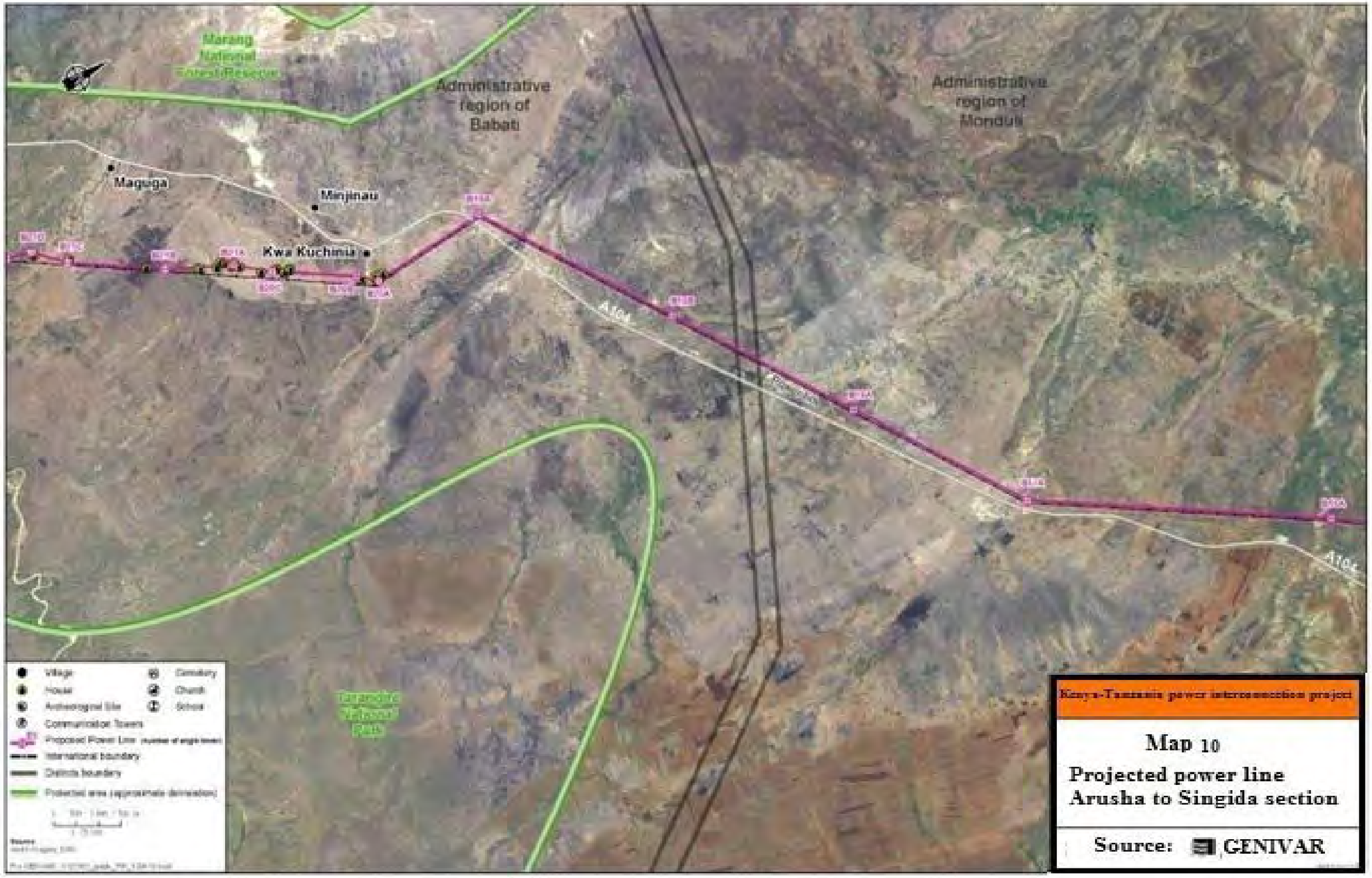

Administrative
region of
Manyara
A104
Longido
Longido
National
Forest Reserve
Village
House
Archeological Site
Communication Towers
Cemetery
Church
School
International boundary
District boundary
Kenya-Tanzania power interconnection project
Map 5
Projected power line
Arusha to Singida section
Source: GENIVAR

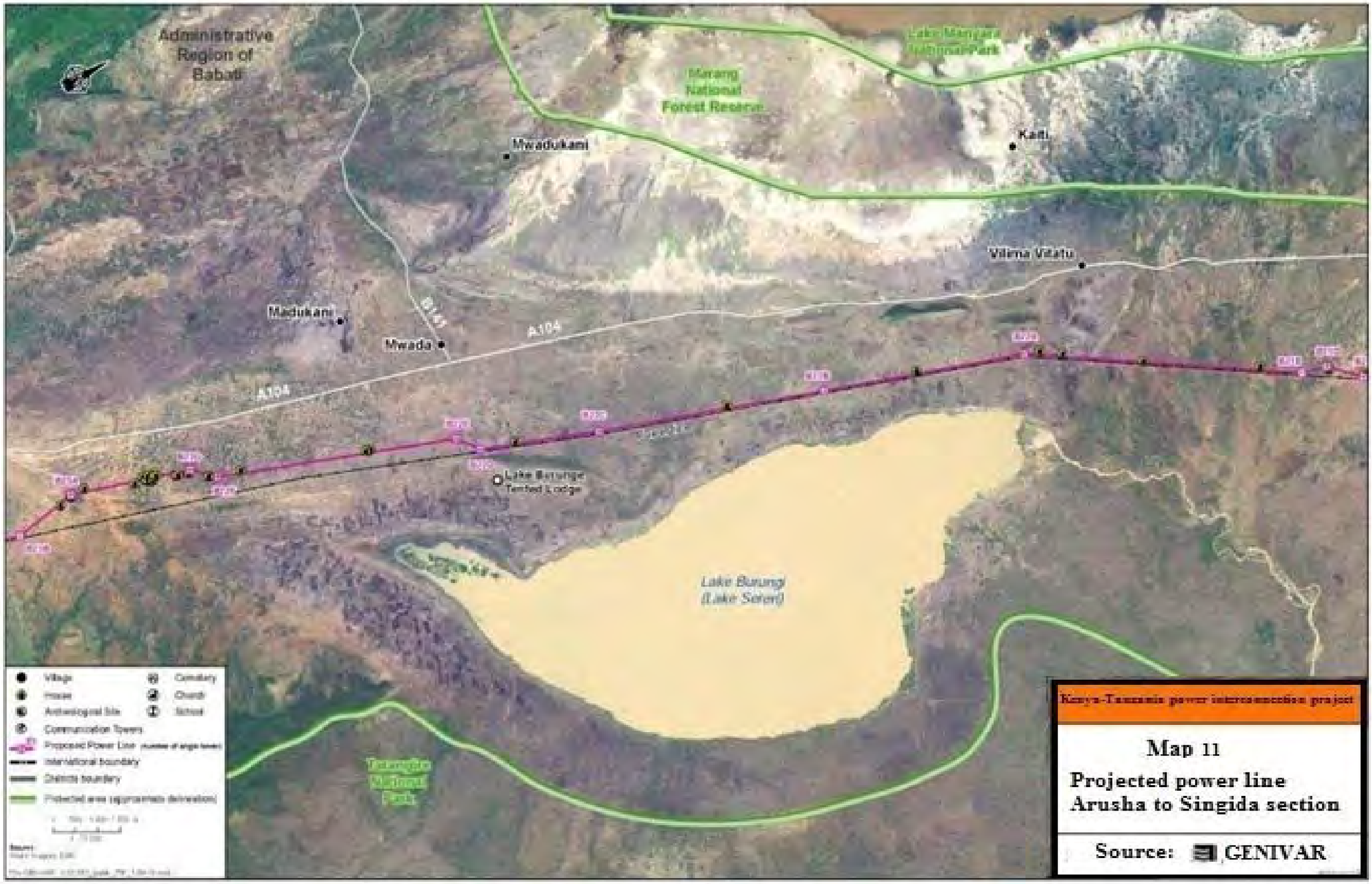

Administrative region of Arumeru
Administrative region of Monduli
Lemongo
A104
Lamboro
Sungate
Village
House
Archeological Site
Communication Towers
International boundary
Districts boundary
Cemetery
Church
School
Kenya-Tanzania power interconnection project
Map 6
Projected power line
Arusha to Singida section
Source: GENIVAR


Monduli National Forest Reserve
Administrative region of Monduli
Administrative region of Arumeru
Administrative region of Arusha
A104
Mkulat
Kisongo
Ngorubob
Engurtoto
Olasiti
Olmotoni
Arusha Airport
Arusha
Arusha National Park
Village
House
Archeological site
Communication towers
Cemetery
Church
School
Proposed Power Line (number of angle tower)
international boundary
Districts boundary
Protected area (approximate delineation)
Kenya-Tanzania power interconnection project
Map 7
Projected Power line Arusha to Singida Section
Source: GENIVAR


Lake Eluanata-Nanja
(Eluanata Dam)
Administrative
region of
Monduli
Administrative
region of
Arumeru
Duka Bovu
Meserani
A104
Village
House
Archeological Site
Communication Towers
International boundary
Districts boundary
Cemetery
Church
School
Kenya-Tanzania power interconnection project
Map 8
Projected power line
Arusha to Singida section
Source: GENIVAR


Loolmalasin
National
Forest Reserve
B144
A104
Makuyuni
A104
Mbuyuni
Loosimingori
Administrative
region of
Mondull
Village
House
Archeological Site
Communication Towers
Proposed Power Line
International boundary
Districts boundary
Cemetery
Church
School
Kenya-Tanzania power interconnection project
Map 9
Projected power line
Arusha to Singida section
Source: GENIVAR


Administrative region of Babati
Administrative region of Monduli
Maguga
Minjinau
Kwa Kuchinja
A104
A104
Village
Cemetery
House
Church
Archeological Site
School
Communication Towers
International boundary
Districts boundary
Kenya-Tanzania power interconnection project
Map 10
Projected power line
Arusha to Singida section
Source: GENIVAR


Administrative Region of Babati
Mwadukami
Karii
Vilima Vitatu
Madukani
Mwada
A104
B141
Lake Manyara National Park
Marang National Forest Reserve
Lake Burungi Tented Lodge
Lake Burungi (Lake Sonet)
Tarangire National Park
Village
Houses
Archeological Site
Communication Towers
Proposed Power Line
International boundary
District boundary
Cemetery
Church
School
Kenya-Tanzania power interconnection project
Map 11
Projected power line Arusha to Singida section
Source: GENIVAR


Kiru
Administrative Region of Babati
Maguga
Madwa
Sigino
A104
Kiongozi
Power line
B143
Babati
Uhome National Forest Reserve
Village
House
Archeological Site
Communication Towers
Proposed Power Line (number of angle tower)
International boundary
Districts boundary
Protected area (approximate delineation)
Cemetery
Church
School
Kenya-Tanzania Power Interconnection Project
Map 12
Projected Power line :
Arusha to Singida Section
GENIVAR

Nou National Forest Reserve
Administrative Region of Babati
Administrative Region of Hanang
Dareda Kati
Ndareda
Dareda Airstrip
Gajal
B143
Masakta
Endasago
Arri
Getasam
Endasak
Masgaroda
Masekaroda
Sigino
Riroda
Power line
Village
House
Archeological Site
Communication Towers
Cemetery
Church
School
Proposed Power Line (number of angle tower)
International boundary
Districts boundary
Protected area (approximate delineation)
Kenya-Tanzania Power Interconnection Project
Map 13
Projected Power line
Arusha to Singida Section
GENIVAR


B143
Katesh
Hanang
National
Forest Reserve
Giting
Dumbeta
B143
Nangwa
Gehandu
Power line
Maeskeron
Endasak
B143
Administrative
Region of
Hanang
Village
House
Archeological Site
Communication Towers
Proposed Power Line (number of angle tower)
International boundary
Districts boundary
Protected area (approximate delineation)
Cemetery
Church
School
Kenya-Tanzania Power Interconnection Project
Map 14
Projected Power line
Arusha to Singida Section
GENIVAR


B50B
B50A
B143
B48A
B47B
B47A
B45A
B44A
Administrative Region of Singida
Administrative Region of Hanang
Lake Balangida Lehu
Mogitu
B143
Village
House
Archeological Site
Communication Towers
Proposed Power Line (number of angle tower)
International boundary
Districts boundary
Protected area (approximate delineation)
Cemetery
Church
School
Kenya-Tanzania Power Interconnection Project
Map 15
Projected Power line
Arusha to Singida Section
GENIVAR


B143
B143
Kinyamwenda
Itaja
Endesh
Administrative region of Singida
Administrative region of Hanang
Sagara
Ngimu
Administrative Region of Singida
Village
House
Archeological Site
Communication Towers
Proposed Power Line (number of angle tower)
International boundary
Districts boundary
Protected area (approximate delineation)
Cemetery
Church
School
Kenya-Tanzania Power Interconnection Project
Map 16
Projected Power line :
Arusha to Singida Section
GENIVAR


Maghumpi
Administrative region of Singida
B141
B3
B58B
B143
Lake Singida
Singida Airport
Singida
Kisasida
Msikii
B60A
Mughamo
Misuna
Existing Singida Substation
B70A
B69A
B68A
B65A
B67
Archaeological Site
Communication Towers
B64A
B63
B62
B61A
Primary School
Power line
Mgori
Lake Kindai
Mungu Mji
Nyranga
B141
Village
House
Archeological Site
Communication Towers
Proposed Power Line (number of angle tower)
International boundary
Districts boundary
Protected area (approximate delineation)
Cemetery
Church
School
0 500 1 000 1 500 m
1 : 75 000
Source :
World Imagery, ESRI
File GENIVAR : X121853_guide_75K_120410.mxd
Kenya-Tanzania Power Interconnection Project
Map 17
Projected Power line :
Arusha to Singida Section
GENIVAR
April 2012

Appendix 2: List of Villages Visited during Community Meetings in Tanzania

District	Village	Date	Number of people attending
Singida Municipal	Misuna	22/06/2011	65
	Kisasida	22/06/2011	19
	Msikii	22/06/2011	34
	Mungumaji	22/06/2011	47
Singida Rural	Kinyangigi	23/06/2011	9
	Kinyamwenda	23/06/2011	55
	Itajia	23/06/2011	45
	Sagara	23/06/2011	33
	Mughamo	22/06/2011	23
Babati	Negamsi	27/06/2011	7
	Malangi	27/06/2011	2
	Matuta	28/06/2011	21
	Sangaiwa	28/06/2011	14
	Vilima vitatu	28/06/2011	34
	Endasago	27/06/2011	13
	Dareda kati	25/06/2011	24
	Mawemairo	28/06/2011	25
	Sigino	27/06/2011	22
	Bagara	27/06/2011	25
	Sarame	28/06/2011	23
	Minjingu	29/06/2011	5
	Olasiti	28/06/2011	15
	Mwada	28/06/2011	49
	Gajal	25/06/2011	22
	Kiongozi	27/06/2011	18
Hanang	Arri	25/06/2011	25
	Dumbeta	24/06/2011	6
	Endagaw	28/06/2011	24
	Getasang	25/06/2011	11
	Meskron	24/06/2011	33
	Mogitu	24/06/2011	32
	Nangwa	24/06/2011	16
	Masakta	25/06/2011	35
	Mara	25/06/2011	4

District	Village	Date	Number of people attending
	Masquroda	25/06/2011	11
	Ming'enyi	24/06/2011	13
	Endasak	24/06/2011	22
	Gehandu	24/06/2011	24
Monduli	Mbuyuni	29/06/2011	14
	Meserani Juu	29/06/2011	15
	Arkatani	29/06/2011	4
	Mti Mmojia	29/06/2011	11
	Loosimingiri	30/06/2011	19
	Nanja	30/06/2011	24
Arusha	Matevesi	30/06/2011	25
	Engurutoto	02/07/2011	10
	Likamba	30/06/2011	13
	Losikito	02/07/2011	14
Longido	Engorora	01/07/2011	24
	Longido	01/07/2011	24
	Lemon'go	02/07/2011	33
	Eurendeke	02/07/2011	24
	Lengijave	01/07/2011	23
	Namanga	01/07/2011	20
	Kimokwa	02/07/2011	23
TOTAL			**1 225**

Appendix 3: Environmental Prescription

The various environmental prescriptions for construction activities which should be included in all Construction Contracts include:

Installation of the construction site

The contractor must take the necessary measures in order that all employees involved in any of the project phases respect the laws and regulations related to the contracted environmental requirements. The contractor must thus communicate, before commencement of work, all the requirements related to the contract and make sure that all the employees have access and take part to the information meetings.

The contractor must name a permanent officer in the field for the duration of the contract, responsible of all environmental issues.

The contractor must submit for approval a plan for all temporary installations.

The contractor must use in priority existing borrow pits or the ones planned in the contract and for which the necessary authorizations have been obtained. In the event of opening new borrow pits, the surface area for exploitation must be clearly delineated in the field.

The contractor should not encroach or excavate in agricultural or urban environments, or in the vegetable protective strip of lakes, rivers or wet environments, without the required authorisations.

The contractor must put aside any fill or excavated material. As much as possible, he must make a beneficial use of the set aside material, notably for levelling the ground.

The contractor must locate, delimit and protect any sensitive element (wells, potable sources of water supply, archaeological sites, etc.) identified within the contract. Should the contractor discover an archaeological vestige during construction work, he must suspend his activities, inform without delay the representative of the Promoter and avoid any intervention likely to compromise the integrity of the element or site discovered.

The contractor must clearly delineate the areas to be deforested, which are indicated in the contract, by using appropriate reference marks, and he must obtain the required authorizations prior to harvesting the trees.

The contractor must produce a statement concerning the state of existing bridges or culverts that will be used. He must also draw up the points of crossing of drainage elements, bridges and culverts to be installed.

The contractor must respect the natural drainage of the area and take all suitable measures to allow the normal water flow. When the surface runoff is likely to involve sediment discharge to rivers, the contractor must apply measures to contain the sediments or divert them in order that they do not reach the rivers.

The contractor must take all the precautions and apply the appropriate techniques in order to reduce erosion due to runoff, particularly in areas of high slope, and to prevent sediments from reaching lakes or rivers.

For the installation of a coffer dam, the contractor must not use contaminated materials.

Fish imprisoned in the drained zone must be captured and released out of the confined area.

When installing bridges or culverts, the contractor will take the necessary precautions to avoid modifying the hydrological conditions, limit the free movement of fish or increase the turbidity of water.

At all times, the contractor will implement the necessary measures in order to prevent the discharge of solid waste, including wood products, in the water. Should such an incident occur, he will have to recover the waste and proceed to disposal in compliance to local requirements.

When using explosives, the contractor must use adequate procedures in order to minimise impacts on the natural environment and surrounding infrastructure and to limit projection of rock and debris outside of the authorized work area or in waterways. For any explosion in or close to a watercourse, the contractor must use mechanical or electronic processes to keep fish away. The explosion must occur as soon as possible after use of one of these processes to make sure that fish have not yet returned.

Management of residual and dangerous/hazardous substances

The contractor is responsible for the recovery, storage, transport and disposal of the totality of the various types of waste which he will generate during project implementation.

Solid waste must be disposed of by the contractor at his own expense in an authorized facility.

Dangerous/hazardous substances or wastes produced by the contractor must be disposed of at his expense in an authorized facility whereas those produced by the Promoter are disposed of at his expense.

The contractor is prohibited of mixing or diluting dangerous/hazardous waste with other matters (dangerous or not dangerous). The mixture of the dangerous/hazardous wastes is allowed only when they are of the same type and when the result of the mixture still constitutes dangerous/hazardous wastes.

The contractor will install, at his expense, a concrete surface where the storage and handling of fuels and oils (supply, discharge, oil change, etc.) will be carried out. These surfaces must allow the containment of the contaminants should an accidental spill occur. They will have to be located at a distance of 60 meters of any sensitive element and of water bodies identified in the contract.

The used oils as well as all material and oil filters (water, rags, etc.) soiled by hydrocarbons will be recovered and stored.

The company will hold a stock book (entry and exit) which will specify the hydrocarbons stock.

The material used for transport and supply of the concrete must be washed on a surface designed for this purpose which will ensure that there are no overflow during its use. It can be a mud tank installed by the contractor within the ground. If necessary, the contractor must remove, at the end of work, the solid residues and dispose them in a dry material container. Finally, he must recover the mud tank with the ground of origin, by taking care to leave a layer of vegetable matter onto the surface.

The contractor must provide an emergency plan in the event of accidental discharge of contaminants. He must make sure that the emergency plan contains, at a minimum, a diagram of intervention and a structure of alarm. The plan must be easily accessible and within sight of all his employees which must be informed of their responsibilities in the event of accidental discharges or spills and of the importance of acting quickly.

The Contractor must immediately apply the emergency plan should an accidental spill or discharge occur.

The contractor must have at least an intervention kit on the construction site. It must contain products adapted to the characteristics of the workplace and be located nearby.

Should an unforeseen discovery of soil with signs of contamination (odours, colour, etc.) occur, the contractor must stop the excavation work and warn without delay the Promoter.

The contractor must dispose of contaminated soil linked to excavation and drilling (carrots, mud, etc.) activities in an authorized facility and obtain a proof of disposal from the facility. This proof of disposal is to be provided to the representative of the Promoter.

Recyclable materials belonging to the Promoter (such as iron, copper, aluminium, etc.) are to be deposited of by the contractor in the containers provided by the Promoter. These materials will then be managed by the Promoter.

The contractor must channel and recover all waste water related to the construction activities. The contractor must filter the produced waste water or use any other approved method which is in compliance with local regulations. Should the waste water be discharged into the hydrographic network, the contractor must refer to the contractual clauses or to the Promoter representative for the discharge criteria. It is prohibited to dilute waste water prior to its discharge in order to satisfy the regulatory standards. The contractor must perform on a regular basis some laboratory analyses to prove that he is in compliance with the discharge criteria.

Circulation on the construction site

The vehicles required to perform the work must be selected by taking into account the site characteristics (type of soil, period of the year, environmental sensitivity, etc.) in order to limit the impacts on the site.

The contractor must limit circulation to the roads and the areas identified within the contract. He must obtain an authorization before using any other way or path.

At all times the contractor must maintain in good condition the paths that he and others are using and must take any necessary measure to ensure that these paths can be used and crossed without any problem.

The contractor must progressively carry out the filling of the ruts as the work progress.

The contractor must protect the edges and surface of the asphalted ways, and he must maintain them clean.

The contractor must stop or limit any heavy circulation in the presence of, for example, sites sensitive to erosion, notably during an abundant rainfall, or on materials of low bearing capacity.

The contractor is held to limit dust emissions coming from the circulation or use of his equipment and must seek approval for the type of dust control measures he intends to use.

The contractor must maintain a system of functional drainage on each side of the roads crossed by his way of circulation. He must install a culvert in the ditches at the edge of the ways, in order to avoid any blocking of drainage and to prevent scrubbing, erosion or any other deterioration of the roads.

The contractor must use the access paths only during the regular hours of work, with special permit.

Health and safety measures

The contractor must provide a communication plan to inform all employees with the risks and the means of preventing sexually transmitted diseases, including HIV.

The contractor must provide a communication plan to inform all employees with the risks and the means of preventing the prevalence of hydrous diseases (diarrheas, amoebic dysentery, and cholera). It is advised to drink only treated water.

The contractor will have to verify the quality and availability of drinking water by means of periodic controls carried out by qualified personnel or employees trained for this purpose.

If water proves to be non -potable following a control, the contractor must warn the personnel on the construction site and to correct the situation as quickly as possible.

Employees must avoid urinating or defecating in or near lakes, rivers and ponds. The company must install, at its expense, improved latrines on the construction site.

First aid pharmaceutical products, suitably preserved, must be available at the company local offices and at the construction sites.

The contractor will ensure that the working conditions do not endanger the health or life of the workers. He will provide the required protection clothes to each worker and will ensure that no worker is allowed on the construction site without a minimum of protective gear.

The contractor will take all the necessary precautions on the construction site such as constructions in height, handling of dangerous/hazardous products, emanation of

dust, protection against noise and explosions. He will ensure that all constructions are made in compliance with the applicable code of practice, in particular with regard to the use of scaffolding or of protective nets and hoisting of loads.

The contractor will ensure that the construction site is clearly delineated and that its access is strictly regulated to limit the risks of accidents.

Prohibitions on the construction site

Any form of poaching is prohibited and weapons are not allowed on the construction site.

It is prohibited to have or consume alcohol or drugs on the construction site.

It is prohibited to cut trees without authorization or to encourage the cutting and the sawing of wood.

It is prohibited to emit, dispose of or reject dangerous/hazardous substances in the environment.

All river crossings are prohibited unless having obtained the required authorizations from the relevant authorities. If necessary, the machinery must be cleaned in the areas designed for this purpose and suitable measures must be taken to restore the areas disturbed by the crossing of a river.

It is strictly prohibited to hide or transport the wood residues out of a deforested area.

It is prohibited to make use of old tires or used oil to accelerate combustion of the wood residues.

Termination of works

The contractor must release from the construction site all materials, temporary installations (bridges, culverts, etc.) and waste, and this is to be performed in compliance with authorized procedures and regulations.
The contractor must carry out work required for the rehabilitation of the damaged areas.

The contractor must replace the topsoil of working or storing sites.
The contractor must level the ground in order to give back its form of origin or to harmonize it harmonizing with the surrounding area.
The contractor must cut down trees damaged by construction work.
The contractor must restore the profile of origin of any river bed or banks.
The contractor must restore the natural drainage to ensure a good drainage of the area.
The contractor must leave the roads in a similar or better state when compared with their state of origin.
During drilling activities, should the ground water be reached, the contractor must cover the area with gravel or clean sand and with an impervious material which will prevent the infiltration of contaminants.

The contractor must fill any bore hole and reconstitute the geological conditions of origin with excavated materials.