
EIA Project Report- Proposed 400KV Power Transmission Line from Loiyangalani to Suswa

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EXECUTIVE SUMMARY

The energy sector in Kenya is regulated by the Ministry of Energy through the Energy Regulatory Commission (ERC) under which lies a number of government owned companies and authorities such as Kenya Power and Lightning Company (KPLC), Kenya Electricity Generating Company Ltd and the Rural Electrification Authority.

There has been a steady rise in electric power demand which has necessitated the government to license a number of independent power producers (IPPs) generating power mainly from fossil fuels and geothermal to supplement existing government-owned generating hydro, thermal and geothermal stations run by KenGen, which account for a total of 80% of total power produced in the country.

There is growing need to seek alternative sources of power with specific emphasis on renewable source of energy due to skyrocketing oil prices and unreliable rainfall, which have put to question the sustainability and reliability of both thermal and hydro power sources.

A feasibility study carried out by LAKE TURKANA WIND POWER LTD in Loiyangalani in Marsabit District shows that 300MW equivalent to 25% of the total existing capacity in the country can be generated from wind. The KPLC has indicated willingness to purchase this capacity.

LAKE TURKANA WIND POWER LTD is proposing to undertake to construct a 400Km, 400KV transmission line from the Loiyangalani to Suswa and a terminal substation at Suswa to connect an existing double circuit transmission line from power line from Olkaria. It is for this reason the proponent contracted Professor B.N.K. Njoroge an EIA Lead expert to undertake Environmental Impact Assessment Study of the proposed project.

The study identified both environmental and social impacts during the engineering survey stage, construction, operational and decommissioning phases of the project presented in Chapter 6 of the report. The consultant has developed an Environmental Management Plan (EMP) presented in Chapter 8 of the report which presents the impacts, mitigation measures, responsible party, monitoring mechanism and an estimate budget.

An evaluation of the impacts resulting from implementation of the proposed project indicates that the negative impacts vary from insignificant, through moderate to significant scale. The EMP developed provides for adequate redress to all these impacts. In view of this therefore, the project does not pose any serious and negative environmental impacts.

The proposed project will inject USD 150 million to the national economy. The project will create employment and improve income earnings in all the areas traversed by the proposed power line.

Following the analysis of the impacts the consultant has made the following recommendations:-

- The proposed project to be implemented in compliance with the relevant legislation and planning requirements.
- The proponent to implement the mitigation guideline provided in the EMP in collaboration with the Contractor.
- That National Environmental Management Authority do consider, approve and grant required Environmental Impact Assessment License to the proponent

1.0 INTRODUCTION

1.1 Introduction to Power Sector situation in Kenya

Presently, the electricity sector in Kenya only reaches an estimated 30% of the population. The Ministry of Energy is vested with the power to regulate and offer oversight and policy direction on all matters regarding power in the country. Under the ministry are different bodies undertaking distinct functions. These are:-

1. Electricity Regulation Commission (ERC)- is an independent body responsible for the regulation of the energy sector
2. Kenya Power and Lightning Company (KPLC) -a parastatal responsible for electricity transmission, distribution and supply to customers. There are proposals to have the power utility split into two companies with distinct functions of power transmission and distribution.
3. Kenya Electricity Generating Company (Kengen) -is a parastatal established under the State Corporations Act with a mandate of generating power. Kengen owns all public power generation facilities in the country and generates 80% of the total output, which it sells to KPLC. It generates most of its electricity through hydroelectric and geothermal power plants, along with fossil fuel plants.
4. Rural Electrification Authority- it is the body charged with the mandate of developing and updating rural electrification master plan, promoting use of renewable energy sources, manage rural electrification fund to support electrification of rural areas.

Due to inadequate power capacity within the Country, a number of Independent Power Producers (IPPs) have been licensed to undertake power generation activities to supplement existing power generation capacity. These include Iberafrica, Westmont Power, Orpower 4 and Tsavo Power.

The interconnected system has an installed capacity of 1219MW comprising 677 MW hydropower, 127 geothermal, 0.35MW, wind 383.5MW thermal, and 30MW non -firm import from Uganda. The effective capacity of interconnected system is about 1,134MW.

The transmission and distribution systems are owned and operated by KPLC. The transmission system consists of 1323 Km of 220kV, 2035km of 132 kV transmission lines and some 600km of 66kV sub transmission

lines. The distribution system consists of 58km of 40kV, 5973 km of 33 KV and 15267km of 11KV.

1.2 Project background

The proponent of the project is LTWP Limited. The proponent has undertaken feasibility studies for the Turkana Wind Farm to be implemented on the south-eastern border of Lake Turkana between Mt Nyiru and Kulal. The Government of Kenya through the Ministry of Lands and together with the Marsabit County council has granted Lake Turkana Wind Power Limited a lease agreement for 150 acres (66Ha) for a period of 99 years to exclusively exploit the wind resources on this site, which is located in Marsabit. The area is sparsely populated with volcanic soil and scattered rocks. This soil does not support vegetation cover and therefore there are minimal economic activities. A separate EIA report for the wind farm has been submitted to NEMA for approval.

1.3 Wind Power Technology

The traditional windmill has for long kept the original technology where a horizontal shaft is connected to the wind vanes, which is in turn connected to the vertical shaft through a right angle transmission.

Windmill technology has in the past two decades been developed into modern turbines for generating electricity. The first significant wind turbines had capacity of 100KW, with steel wind blades.

The capacity has since increased significantly with new, larger mills and better materials. The safety was drastically improved by using stronger, but also lighter materials. The knowledge and insight in wind streams and climates lead to development of modern turbines that anticipate the rapidly changing condition during rains, storms, lightening, etc.

The turbine output has continued to grow with time. While the largest wind turbine in 1990 had a capacity of 225KW, today's turbines can produce up to 6MW each. The diameter of rotor increased from 27m to 112m and the shaft height (hub height) from 30m to 125m.

The latest turbine models are equipped with sensors connected to computers to determine undesired vibrations for preventative actions and for independent control of individual rotor during rotation. This improves the efficiency.

1.4 Choice of Technology for Lake Turkana Wind Project

Lake Turkana Wind Power (LTWP) choice of wind turbines was informed by the following criteria;

- Widely used technology that has proven reliable under the most difficult circumstances
- Ability to operate under the prevailing, extreme conditions, namely dust, high temperature, high wind speeds.
- Low maintenance and hence cost of Operation and Maintenance
- Reliable supplier.
- The need to generate additional power to drive the economy in consideration of maximum capacity from the existing sources

Based on the above criteria, LTWP has chosen VESTAS, the global market leader in supply of wind the turbines. LTWP has chosen Vestas V 90 with a capacity of 3MW, which was first launched in 2002 in Sweden. V 90 is highly durable because the main bearing is integrated into the transmission. This ensures that the main shaft is better supported over a

longer length and less torsion occurs in the shaft. The aerodynamics of V 90 has been improved resulting in decreased total weight. It also uses a fluid based cooling technique that protects turbines from dust and sand.

The project will consist of 100 turbines, each with a capacity of 3 Megawatts. The total foreseen power generated by the project will therefore amount to around 300MW, adding 25% to the total existing installed capacity available in Kenya. The KPLC has confirmed its interest to purchase this capacity.

2.0 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

2.1 Introduction

Power transmission projects fall under the Second Schedule of EMCA (1999) and proponents undertaking such projects are required to conduct EIA study before implementation. Anset Africa Ltd proposes to construct a wind power generation station at Loyangalani in Marsabit District and consequently construct a 400km, 400kV transmission line to Suswa. In addition a terminal substation will be constructed at Suswa where the proposed line is connected to the double circuit line from Olkaria geothermal station.

2.2 Scope of Works and Terms of Reference

The Terms of reference (TOR) of this EIA Project Report for the proposed 400KV power transmission line from Loyangalani to Suswa and substation at Suswa addresses the following key specific objectives:

- To review existing legal and institutional framework related to the proposed project
- To collect and collate baseline information relevant to the proposed power transmission line and terminal substation at Suswa.
- To collect primary data through the community participatory process.
- To identify and assess positive and negative impacts of the proposed project
- To identify and analyze alternative options for the proposed project
- To develop mitigation measures and cost estimates for the negative impacts of project.
- To design an Environmental Management Plan (including cost estimates) and a monitoring framework for the environmental impact of the project.

2.3 Study Approach

The Consultant undertook desk study of the project through;

- Study of the project literature background
- Interviews and meetings with the proponent
- Interview with the project Surveyors

Questionnaires

Structured and semi structured questionnaire were prepared and administered to the key informants of the interview. This included members of the public, local leaders, key institutions, group ranches owners and key community owners. The respondents were introduced to

the project background, scope. Appendices 1 to 4 present sample questionnaires administered to Community members, community leaders and various institutions. The main aim of the questionnaires was to obtain views of the stakeholders and distil the main concerns elicited by the proposed project.

Transect Walks

To understand the biophysical nature of the project area the field teams had to walk through the proposed power line way leaves. In the walks the teams were able to identify the salient features of the project area and meet the stakeholders, identify sampling points and assess possible alternatives to the proposed power line.

Public Consultations

The Consultant organized forums for public participation to enable interested and affected parties to present their concerns and opinions regarding the proposed power project. The consultant shall identify social aspects and effects of the project to the neighbouring populace throughout the project cycle that include the construction, commissioning and operation phases.

Through the facilitation of the respective project area district officers, area chiefs, assistant chiefs, councillors and key community leaders the consultant organized for Public meetings where the community members were briefed on the proposed project background, scope, design outline and the regulatory requirements for all the projects of lesser / similar / higher magnitude whose implementation approval is vested on National Environmental Management Authority (NEMA). A sample programme of the public consultation schedule is presented in Appendix 5-1

The public was then invited to express their views given the background of the project. The views for each of the meetings were recorded. This was especially significant since the proposed project traverses a wide area of varying degree of cultural, economic, social and physical environments. Appendices 5-2 to 5-16 represent lists of participants in the public consultation meetings held in different places along the proposed transmission line corridor. Plates 2 to 7 give photographic documentation capturing the proceedings of some of the meetings.

Meetings with Provincial Administration and relevant authorities

Meetings to brief the local provincial administration leaders on the projects background, scope, objective and the specific proposed routes within their area of jurisdiction were held. The leaders involved in this included;

- District Commissioners
- District Officers
- Chiefs
- Assistant chiefs
- Councillors
- Village elders
- Accounting officer of the County Councils
- The Kenya Wild Services officers
- The Kenya Forest Service

Focus Group Discussion (FGDs)

The Consultant engaged groups such as ranch owners, School heads, teachers, and missionaries, health practitioners in discussion on the proposed power transmission line. Their observation and concerns were recorded. These groups seemed to be the most knowledgeable and were quick to grasp the technical issues relating the project implementation. They were specifically targeted with the hope that they propagate the technical issues in a language and style that can be understood by the wider community within their vicinity.

Observations

Observations of the biophysical, economic and social environment of the project areas were made. These informed the subsequent interviews that the consultant undertook and in the final analysis of the impacts of the project.

Photography

Photography was employed to capture the public meeting attendance and the physical environment of the project area. A sample of photo gallery capturing key features along the proposed corridor is presented in Appendix 6

Sampling

The consultant took water sample from the major water sources traversed by the proposed power transmission pipelines for analysis. This was principally meant to capture the chemical and physical baseline characteristics of the water sources. The water samples were taken for

analysis at the Environmental Health Engineering laboratory, University of Nairobi. This will form the blue print for future environmental audits and assessment of project impacts on the water supplies. Appendix 7 presents result of physico -chemical characteristics for water samples from Malewa, Pesi rivers Baragoi dam and Poro river

3.0 BASELINE INFORMATION

3.1 Topography and Physiography of the project area

The Proposed project traverses four major physiographic zones;

1. Rift Valley
2. Nyandarua escarpment
3. Laikipia plateau
4. The basement uplands

Laikipia plateau

The escarpment varies in altitude from 2600m in Marmanet forest to 1900m at Churo, south of Loriki plateau. To the east Laikipia plateau drops gradually down to an elevation of about 1645m in the south and in the north near Lake Kisima to about 1737m.

To the western, the rift related faulting controls the outline of certain minor alluviated troughs on the plateau, the largest of which is the upper Ol Arabel Basin. Smaller basins to the north include the northern Plain, Luoniek, and Churo.

To the east the Ewaso Narok and Ol Keju Losera river systems do little to relieve the monotony of the high lava plains. In the south, gentle warping of the lava pile has contributed to the ponding in the valleys e.g. the Ewaso Narok and Pesi swamps where papyrus, swamp grass and reeds flourish. The highest areas at Marmanet and Ol Arabel forests support a cedars and podocarpus trees. To the north east the forest gives way to more open and clumpy evergreen and semi-deciduous types. South east of the Ewaso Narok acacia trees predominates in the mixed savannah and grassland.

On the Loriki plateau in the north, the upper part of lava sequence gives rise to series of up to five escarpments.

The basement uplands

The topography of this zone is more diverse varying from 1190m in the lowest part of Ewaso Ng'iro valley, to 2240m at the Loriki forest.

Ewaso Ng'iro uplands rising to 1675m support an upland acacia type of vegetation. The Kirisia hills - Loroki forest is steep and slopes down to Lake Kisima. Soils tend to be reddish brown, sandy and stony loams on the lower slopes and dark brown loams in the highest parts of the forest.

Drainage

West of Laikipia plateau the rivers drain inland, to the rift valley- to the east the Ewaso Narok - Ewaso Ng'iro systems drains towards Indian Ocean, as does Ol Keju Losera - Seiya Rivers via Melgis west of Nyahururu. The watershed between the internal and east flowing drainage is aligned only 2 to 3 km east of the main Laikipia escarpment but northwards it's displaced to the east until it coincides with the Loriki plateau.

Ewaso Ng'iro is the largest river around this section and it flows due north for about 80km before making an abrupt bend to the east-north - east near Karimun.

The upper regions of the project area fall into two three major physiographic zones;

- 1 Kirisia hills
- 2 Undulating eastern lowland
- 3 Ndotos and eastern highlands

Kirisia hills

Kirisia hills attain a maximum altitude of 2582m at Poro. Their northern end summit levels generally exceed 2000m with several flat peaks at about 2200m above sea level. The northern eastern slopes have a gradient of up to 1:2 to base levels of about 1400m.

Undulating Eastern lowlands

Three distinct land forms are found within this physiological province; major hill or inselbergs, undissected (residual plains) and rugged country sides. El barta plains in the north are not affected by major river erosion; the plains have thick soil cover infilling surface height decreasing inwards from about 1500 to 1300m asl. The eastern lowland is cut by several major drainage systems. Active soil erosion especially by headwater streams has stripped the soil cover and is reducing land levels dramatically.

Ndotos and Eastern highlands

The western slope of the Ndotos extends up to El barta plains. Immediately to the east they rise to over 2600m.

3.2 Drainage

The area is drained by three major river systems; Suguta River in the volcanic terrain, Milgis (Barsaloi – Seiya) Rivers and Korante plain water courses in the eastern metamorphic areas. Most watercourses are ephemeral except for the headwaters stretches of rivers fed from permanent springs. These include Suguta River and many rivers emanating from Kirisia hills around Poro and Morijo.

3.3 Geology of the project area

The northern section of the project area consists of vast alluvial inland plains, inclining from altitudes of about 1200 m to the North of Mt. Kenya to barely 400 m around Lake Turkana. On the Southwest, a chain of mountains consisting of old crystalline Precambrian basement rocks, mainly extremely durable gneisses and granites, borders the plains. For this reason, the steep Ndoto and Nyiru Ranges, reaching up to 2752 m, were left standing during the different erosion cycles influencing the region. Next to these, a series of Quaternary volcanic peaks, like Mt. Kulal (2285 m), Mt. Marsabit (1707 m) and the Huri Hills (1479 m), tower over the inland plains. In contrast to the soils of the plains, which consist mainly of Vertisols, Regosols, Lithosols and Cambisols, the mountain slopes are mainly covered with humic Acrisols over the basement formations, and deep, humic Andosols in volcanic areas.

3.4 Climate

According to the climatological classification of Jätzold, the northern plains are part of the hot, arid tropical climate, with two short sub-humid seasons. Mean monthly temperatures range from 20–26°C in the plains, to 17–19°C in the mountains (Gatab, 1657 m). The average annual rainfall can be as low as 100–150 mm in the Hedad plain and Chalbi desert, rising to 500 mm in the valleys of the Nyiru and Ndoto mountains. In the mountain forest zone, a rainfall of about 1200 mm can be reached. The main rainfall is concentrated in two wet seasons, from March to May and from October to December. However, extreme rainfall occurs, e.g. 175 mm in 6 hours in Gatab on Mt. Kulal.

3.5 Vegetation

General

Most mountain areas in northern region of the project area are covered with evergreen montane forest. They owe their existence to the humidity received from mist condensation and frequent cloud formation in the peak areas. Due to their enormous importance as

water catchments, most mountain areas are gazetted as forest reserves. The extent of these reserves, however, does not really reflect the amount of land actually covered with forest. The Mt. Nyiru forest reserve measures a total of 45,496 ha of which barely 7,890 ha are covered with true forest.

The main reasons for forest destruction in the area are;

- Charcoal burning,
- Timber harvesting
- Fires - caused by honey-hunters and pastoralists, who burn the old grass at the start of the wet season.
- Overgrazing in the forest,
- Firewood needs of a fast-growing population.

Rumuruti - Longewan

The vegetation cover in this area is influenced by the arid and semi arid climate of the area. It consists mainly of dry grassland, acacia, and cactus and dwarf shrubs. The vegetation along the river valley is greenish and characterized by peasant bucket type farming. This is the case on Pesi and Ewaso Narok swamps.

Longewan - Morijo

The vegetation profile on this section of the proposed transmission route is highland like. The vegetation cover is influenced by Polo Mountains whose elevation is 2500masl. The highland climate supports small and large scale agricultural activities mainly maize and wheat. At Morijo location and parts of Poro location a fairly dense forest cover occurs with minimal undergrowth as a result of widespread livestock grazing. The forest cover is however under extreme pressure from timber logging and charcoal burning activities.

Morijo - Marti - South Horr

The climate of the area is arid and semi arid. The vegetation consists mainly of dry grassland, acacia, and cactus and dwarf shrubs with no agricultural activities. Between Morijo and Marti the undergrowth grassland cover is fairly dense. This area is largely uninhabited and is reputed to be a battle zone among Pokot, Samburu and Turkana people.

South Horr Valley

The vegetation of South Horr valley comprises of sparsely spread acacia trees vegetation and dry undergrowth grassland. Within the

valley and close to South Horr valley market centre the community members practice minimal irrigated agriculture.

South Horr Valley - Loyangalani

The vegetation between South Horr and Gatab varies with the changing altitude. From South Horr moderately scattered acacia trees abound. These are then replaced by dwarf vegetation

3.6 Wildlife

The proposed corridor has a rich mix of animal and bird species distributed along the entire corridor. There are a number of wildlife conservancies especially in area of Rumuruti. From the inception stage, the selection of the transmission power route aimed to avoid interference /encroaching to the wildlife sanctuaries which in some cases host some of the endangered species such as black Rhino sanctuary .These include zebras, Thompson's gazelles, grant's gazelles, Dik dik, spring hare, Irrands, giraffes, elephants, hyenas, baboons, Impala, warthog, spring hare, hart beasts, wild beasts, buffalo, lions, cheetahs and leopards, wild dogs etc. Numerous bird species also exist including swifts, swallows, white fronted bee eaters, augur buzzards, helmeted guinea fowls, owls, vultures, doves, ostriches, etc.

3.7 Transport

The project area is accessed through Suswa, Mai Mahiu, Narok, Naivasha, Gilgil, Olkalau Nyahururu, Rumuruti, Maralal, Baragoi South Horr, Loyangalani road. The road network is tar sealed up to Rumuruti town. Between Rumuruti and Maralal the road is gravel filled and is currently undergoing rehabilitation through grading and gravelling and construction of drainage facilitates.

Between Maralal and Loyangalani, the road network is poorly maintained. Some sections of the road are impassable during the rainy seasons.

A network of earth roads radiate from the main Rumuruti - Maralal - Baragoi - Loyangalani road to the proposed power transmission pipelines. They too are impassable during the rainy seasons.

The project implementation might have to consider improvement of the existing access roads for efficient transport of construction materials.

3.8 Socio-Economic Profile

There are two distinct identifiable zones based on the demography and settlement patterns viz a moderately highly populated area between Suswa and Rumuruti and a sparsely populated area between Rumuruti and Loyangalani.

3.8.1 Suswa -Rumuruti section

Communities occupying this section include Maasai, Kikuyu and Samburu whose socio-economic orientations are greatly influenced by the climatic conditions of the areas they occupy. The section manifest a mix of economic activities ranging from cattle rearing and wheat farming at Suswa - Longonot area to small scale mixed farming section lying in Nyandarua District. The favourable climatic conditions in the area promote growth of food crops such as maize, beans cabbages, peas, potatoes and rearing of high quality grade cattle. In some area around Kipipiri and Ol Kalou settlements going up to Aberdare escarpment at Shamata, there are small scale commercial Eucalyptus farming with most of the trees being sold to power utility. In this area, land is highly subdivided with many individuals holding freehold registered titles with most of the land parcels being less than 10 acres. From these activities, the average annual incomes for the families range from between Kshs 75,000 to 350,000. There are few white owned flower farms in this area.

From sample survey on area, it was observed that the average size of household is 6 persons housed in temporary manyattas, semi-permanent and a limited number in permanent houses.

Residents of the area between Suswa and Longonot experience severe water shortage as there are no perennial surface water sources. The main sources of water in this area are boreholes drilled through government interventions and local NGOs. In contrast the section lying in Nyandarua District has a number of water sources including tributaries of the Wanjohi and Turasha Rivers and in part tributaries to the Malewa river system. In addition, there are several springs that have been tapped by the local community. In this section, it was observed that the main public health concern is the threat of occasional malaria, typhoid and eye infections.

3.8.2 Rumuruti- Loyangalani section

The area between Rumuruti and Loyangalani occupies a total of 250km of the proposed transmission line. The area is inhabited by communities Samburu, Turkana, Pokot and Rendille. In some areas between Rumuruti and Maralal, there are a number of white ranchers.

The population densities are low and the area is characterized by large parcel of land occupied by large-scale beef ranchers and local communities engaging in pastoral nomadism. While the few ranchers in the area live in permanent structures, the locals dwell in temporary clustered manyattas due to insecurity. The average household sizes vary from 6 to 10 persons. There are numerous wildlife conservancies in the area. Land ownership in this area falls into four different categories trust land under the county councils, leasehold and communal ownership and a few individuals holding registered titles. Individual household incomes vary from between Kshs 45,000 to 2,000,000. The main water sources in the area include rivers, small dams, pans and boreholes. Also observed was the fact that malaria, typhoid, eye infections are the common diseases affecting communities living in this area.

The water quality for the samples obtained from Malewa and Pesi rives indicate that the water is fairly turbid and requires minimum treatment to be potable. Samples obtained from Poro River and Baragoi dam indicate contents of salts and suspended solids within treatable limits. These result would be used for comparison purposes in future monitoring of the water sources in relation to the power transmission line.

4. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

4.1 Environment Management and Co-ordination Act

The Environment Management and Co-ordination Act 1999, is the legislation that governs Environmental Impact Assessment (EIA.) studies in Kenya. The Kenya Power and Lighting Company (KPLC) limited carried out an EIA as per the second schedule of this Act.

This schedule lists the projects required to undergo EIA studies in accordance with section 58(1), (2), (3) and (4) of the act. Electrical infrastructure is covered in part 10 of this schedule and this includes electrical transmission lines and electrical sub-stations which is the core part of this project.

The Act set-ups the National Environmental Management Authority (NEMA) whose objective and purpose is to perform general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government in the implementation of all policies relating to the environment.

With the introduction of Environment Impact Assessment and Audit Regulations, (2003) issued through the Kenya Gazette Supplement No. 56 of 13 June 2003, the submission of environmental reports became mandatory. According to these regulations no proponent shall implement a project likely to have a negative environmental impact or one for which an Environmental Impact Assessment has been concluded and approved in accordance with these regulations.

The core functions of NEMA are to:-

- Co-ordinate the various environmental management activities being undertaken by the lead agencies.
- To promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya.
- Take stock of the natural resources in Kenya and their utilization and conservation.
- Establish and review land use guidelines.
- Examine land use patterns to determine their impact on the quality and quantity of natural resources.

- Carry out surveys which will assist in the proper management and conservation of the environment.
- Advise the Government on legislative and other measures for the management of the environment or the implementation of relevant international conventions, treaties and agreements.
- Advise the Government on regional and international conventions, treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements.
- Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys.
- Mobilize and monitor the use of financial and human resources for environmental management.
- Identify projects and programmes for which environmental audit or environmental monitoring must be conducted under this Act.
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur.
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities. Management objectives must be adhered to and adequate early warning on impending environmental emergencies is given.
- Undertake, in cooperation with relevant lead agencies, programmes intended to enhance environmental education and public awareness, about the need for sound environmental management, as well as for enlisting public support and encouraging the effort made by other entities in that regard.
- Publish and disseminate manual codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.
- Render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection, so as to enable them to carry out their responsibilities satisfactorily.
- Prepare and issue an annual report on the State of Environment in Kenya and in this regard, may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency.

4.2 The Water Act (Act No.8 of 2002)

This is an Act of Parliament to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services; to repeal the Water Act (Chapter. 372 of the Laws of Kenya) and certain provisions of the Local Government Act; and for related purposes.

In addition to this act and in furtherance of the said related purposes the Minister for

Water and Irrigation, through the powers conferred to him by Sections 47(6) and 110(1) of the Water Act, 2002, made THE WATER (WATER SERVICES LEVY) REGULATIONS, 2008. This sought to impose a levy of one per cent (1%) of all sales of water services to consumers by each water service provider operating under the Act.

The Water Act, in general, gives provisions regarding the ownership of water, institutional framework, national water resources, management strategy, requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Section 59 of the Act states that the National Water strategy shall contain details of:-

- Existing water services.
- The number and location of persons who are not being provided with basic water supply and basic sewerage.
- Plans for the extension of water services to underserved areas.
- The time-frame for the plan; and
- An investment programme.

4.3 Occupational Safety and Health Act 2007(CAP 15)

This Act came into operation in the year 2008. The Act applies to all workplaces where any person is at work, whether temporarily or permanently.

The purpose of the act is to secure the safety, health and welfare of persons at work; and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work.

Section 19 of the Act provides that an occupier of any premises likely to emit poisonous, harmful, injurious or offensive substances, into the atmosphere shall use the best practicable means to prevent such emissions into the atmosphere; and render harmless and inoffensive the substances which may be emitted.

Section 16 provides that no person shall engage in any improper activity or behaviour at the workplace, which might create or constitute a hazard to that person or any other person.

4.4 Electric Power Act (Act No. 11 of 1997)

This Act of Parliament has as its intention the amendment and consolidation of the law relating to the generation, transmission, transformation, distribution, supply and use of electrical energy for lighting and other purposes, and for connected purposes.

The provisions of this Act apply to every public or local authority company, person or body of persons generating, transmitting, distributing, supplying, or using electrical energy, and to all works or apparatus for any or all of these purposes.

The Kenya Gazette Supplement No.1 (Act No.1) of 9 January 1998 addresses issues related to supply of electric power, distributing mains and provision of licenses. Article 40 of the Kenya Gazette Supplement states that: Any new works, and any extension or amplification of any existing works, for any of the purposes of generating, transforming, converting, transmitting, distributing or supplying electrical energy under any license shall be carried out and performed in the mode and with the material or apparatus of the Kenya Bureau of Standards or where no such standards exist, to comply with the relevant International Standards approved by the Kenya Bureau of Standards.

The Act goes on to provide that for the purpose of the conveyance, transmission, or supply of electrical energy, the Minister may, upon recommendation by the Board, authorize any licensee to erect, fix, install or lay any poles, wires, electric supply lines, pipes or other apparatus in, upon, under, over or across any public streets, road, railways, tramways, rivers, canals, harbours or Government property in such manner and on such conditions as herein provided or as he may approve.

The contracts for the sale of power or transmission services between and among electric power producers, public electricity suppliers and large retail consumers shall be submitted to the Energy Regulation Board for

approval and provisions of any contract approved by the Board shall be legally binding on all parties.

4.5 Agriculture Act (Chapter 318 of the Laws of Kenya)

This statute seeks to promote and maintain a stable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry.

The Minister administering the Act, after concurrence with the Central Agricultural Board and consultation with the District Agricultural Committee, can impose land conservation orders on lands to control cultivation, grazing and clearing. These controls may be necessary to protect the land against soil erosion, to protect fertility, and to maintain catchments. Local authorities are generally empowered to administer these sections of the Act and the District Agricultural Committee is entitled to make regulations relating to these controls.

Agricultural Rules are prescribed under the Act, whereby vegetation clearing in steep slopes areas or adjacent watercourses, without authorization, is controlled.

4.6 Wildlife (Conservation and Management) Act Chapter 376 of the Laws of Kenya

This Act of Parliament deals with the consolidation and amendment of the law relating to the protection, conservation and management of wildlife in Kenya; and for purposes connected there with and incidental thereto.

The act provides that where it is desirable that the present powers relating to the management and conservation of wildlife in Kenya should be amalgamated and placed in a consolidated Service of the Government and the prime objective of the Service should be to ensure that wildlife is managed and conserved so as to yield to the Nation in general and to individual areas in particular, optimum returns in terms of cultural, aesthetic and scientific gains as well as such economic gains as are incidental to proper wildlife management and conservation and which may be secured without prejudice to such proper management and conservation.

For the achievement of that objective, that full account should be taken of the varied forms of land use and the inter-relationship between wildlife conservation and management and other forms of land use.

The Act controls activities within the park, which may lead to the disturbance of animals. Unauthorized entry, residence, burning, damage to objects of scientific interest, introduction of plants and animals and damage to structure are prohibited.

4.7 Land (Group Representatives) Act (Chapter 287 of the Laws of Kenya)

This is an Act of Parliament to provide for the incorporation of representatives of groups who have been recorded as owners of land under the Land Adjudication Act, and for purposes connected therewith and purposes incidental thereto.

4.8 Way leaves Act (Chapter 292 of the Laws of Kenya)

This Act of Parliament provides that any person in the service of the government and any contractor executing any work for the Government, together with his agents and servants, may at any time enter upon any land for the purpose of surveying, setting out and marking the line of any intended sewer, drain or pipeline, or for the purpose of inspecting, repairing, removing, re-laying or cleansing any sewer, drain or pipeline the property of the Government, or for any other purpose under this Act.

4.9 Physical Planning Act (No. 6 of 1996)

This Act of Parliament provides for the preparation and implementation of physical development plans and for connected purposes.

Section 36 of this Act provides for Environmental impact assessments and states that:-

If in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report.

4.10 Land Acquisition Act (Chapter 295 of the Laws of Kenya.)

The Land Acquisition Act makes provisions for the compulsory acquisition of land for the public benefit. Under the Act the Commissioner of Lands may in writing authorize any person, together with servants and workmen, to enter upon any land specified in a notice and to survey the land and to do all things which may be reasonably necessary to ascertain whether the land is suitable for the purpose for which it may be required.

Where land is acquired compulsorily under this Act, full compensation shall be paid promptly to all persons interested in the land.

In Kenya we have a plethora of enactments all governing land and transactions in land. Thus the substantive land law is to be found in two different statutes while the adjectival land law is to be found in five different statutes not forgetting the customary land law of the various tribes in Kenya.

Systems of Substantive Land Law

There are two systems of substantive land law in Kenya these are:

- The Indian Transfer of Property Act 1882 as amended by the 1959 Amendment Act. This Act sought to amend the law relating to the transfer of property by act of parties, whereby the transfer of property means an act by which a living person conveys property, in present or in future, to one or more other living persons, or to himself, or to himself and one or more other living persons.
- The Registered Land Act (Chapter 300 of the Laws of Kenya.) The intention of this Act of Parliament is to make further and better provisions for the registration of title to land, and for the regulation of dealings in land so registered, and for purposes connected therewith.

Conveyance systems

There are three systems of conveyancing and these are those applicable to land registered under:

- ⊕ The Government Lands Act (Chapter 280 of the Laws of Kenya). This Act of Parliament seeks to make further and better provision for regulating the leasing and other disposal of Government lands.
- The Land Titles Act (Chapter 282 of the Laws of Kenya). This Act of Parliament seeks to make provision for the removal of doubts that have arisen in regard to titles to land and to establish a Land Registration Court.
- ⊕ Registration of Titles Act (Chapter 281 of the Laws of Kenya): This is an act of parliament to provide for the transfer of land by the registration of titles. Section 32 provides that no instrument, until registered in the manner prescribed in the act shall be effectual to pass any land or any interest therein, or render the land liable as security for the payment of money, but upon the registration of an instrument in the manner prescribed the land specified in the instrument shall pass, or, as the case may be, shall become liable as security in the manner and subject to the agreements, conditions and contingencies set out and specified in the instrument, or declared by this Act.

- ⊕ Registered Land Act (Chapter 300 of the Laws of Kenya.) This is an Act of Parliament intended to make further and better provision for the registration of title to land, and for the regulation of dealings in land so registered, and for purposes connected therewith.

Registration Systems

The five registration systems are those under: -

- ❖ The Government Lands Act (G.L.A.)
- ❖ The Registration of Titles Act (R.T.A)\
- ❖ The Land Titles Act (L.T.A)
- ❖ The Registration of Documents Act (Chapter 285 of the Laws of Kenya): This is an Act of Parliament to provide for the registration of documents. It states that: all documents conferring, or purporting to confer, declare, limit or extinguish any right, title or interest, whether vested or contingent to, in or over immovable property (other than such documents as may be of a testamentary nature) and vakallas shall be registered. It should be noted that this Act isn't peculiar to Land Law, as documents completely unrelated to land can be registered under it.
- ❖ The Registered Land Act (R.L.A)

Land Ownership

Absolute or complete ownership in land vests in the state. Under the Government Lands Act the Commissioner of Lands, on behalf of the Republic of Kenya grants leases of town plots for any term not exceeding ninety-nine(99) years and of agricultural land for a term not exceeding nine hundred and ninety-nine(999) years.

The grantee (the person receiving the land) becomes the owner and subject to the terms and conditions of the lease he possesses the bundle of the rights of ownership. The 999-year leases can be converted into freehold leases and the 99-year leases into 999-year leases.

On conversion or expiry of the Lease, a new grant may be issued under The R.L.A or the R.T.A. All un-alienated land other than trust land and all reversion of Government leases are vested in the Government, other lands whether held on freehold or leasehold are vested in the grantees as owners having the rights over them.

The power of the State to qualify (extinguish) property rights in the public interest is embodied in section 75 of the Kenyan Constitution. The Section however makes the exercise of that power subject to due process (this includes the payment of prompt and adequate compensation) Section 117

of the Constitution further provides that an Act of Parliament may empower a county council to set apart trust land for the use and occupation of any person or persons for a purpose which is likely to benefit the residents of that area.

Section 117(4) stipulates that the setting apart of such land is void unless the law under which it is made makes provision for the prompt payment of full compensation. The Trust Land Act, in Sections 7 to 13, makes provisions for the setting apart of land and payment of compensation with regard thereto. All land in urban areas of Kenya and much of the land in rural areas has a registered title. The title to land is either freehold or leasehold. The development and use of freehold title is controlled by land planning regulations which are administered by both the Central Government and the Local Authority in which the Land is situated. (A local Authority is either a County Council or a Municipal Council whose activities are established and controlled by the Local Government Legislation.)

Leasehold land is held on leases from the Central Government or, less frequently, from the Local Authority and such lease will contain provisions governing the development of the land and the use to which the land can be put. The leases frequently contain provisions against any dealing with the land without the consent of the landlord. The Central Government administers its land through a Department of Lands which is headed by a Commissioner of Lands.

4.11 The Public Health Act (Chapter 242 of the Laws of Kenya)

This Act of Parliament makes provisions for securing and maintaining health. It contains directives that affect human health. Section 3 of the Act establishes the Central Board of Health which shall consist of the Director of Medical Services (who shall be chairman), a sanitary engineer, or such person as may be appointed by the Minister to perform the duties of sanitary engineer, a secretary, and such other person or persons not exceeding six (three of whom shall be medical practitioners) as are appointed from time to time by the Minister.

There are provisions within the Act to deal, in a general way, with water, air and noise quality as they pertain to human health. An environmental nuisance is defined and includes the emission from premises of wastewaters, gases and smoke which could be regarded as injurious to health. The owner and/or occupier of premises responsible for such nuisances are liable to prosecution under the Act.

4.12 The Chiefs' Authority Act (Chapter 128 of the Laws of Kenya)

This is an Act of parliament, which makes provisions in regard to the powers and duties of chiefs and to provide for matters incidental thereto.

It provides that any chief may from time to time issue orders to be obeyed by the persons residing or being within the local limits of his jurisdiction for any of the following purposes:-

- To prevent the pollution of water in any stream, water course or water-hole, and prevent the obstruction of any stream or water course.
- To regulate the cutting of timber and the wasteful destruction of trees.
- To prohibit any act that might cause damage to any public road or any work constructed and maintained for the benefit of the community
- Controlling of grass fires
- Regulating the use of artificial water supplies constructed from public funds.
- Preventing the spread of disease, whether of human beings or animals.
- Prohibiting any act or conduct which in the opinion of the chief might cause a riot or a disturbance or a breach of the peace.
- For any other purpose authorized by this Act.

The Chiefs' Authority Act also provides for the Minister to authorize any chief to issue orders for work or services for the conservation of natural resources.

4.13 Local Government Act (Chapter 265 of the Laws of Kenya.)

This is an Act of parliament, which provides for the establishment of authorities for local government; to define their functions and to provide for matters connected therewith and incidental thereto. The Act is connected with a wide range of matters that affect the day-to-day activities of individuals and organizations.

Section 163A of this Act gives the local authority the power to grant business permits. It states that a local authority may on receipt of an application under this Act grant a business permit to allow the conduct of a business or trade, including a profession or occupation within its area. Provided that in the case of a business, trade, profession or occupation regulated by the provisions of any other written law, a person shall prior to the submission of an application for a business permit pursuant to this subsection, satisfy all the requirements of that other written law.

Section 163 is another important part of the Act it gives every town council and urban council power, to control or prohibit all businesses, factories and workshops which, by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighborhood, and to prescribe the conditions subject to which such businesses, factories and workshops shall be carried on.

Section 145 of the Act is concerned with the miscellaneous powers of local authorities subsection (w) empowers local authorities to take measures that may be necessary or desirable for the preservation or protection of wildlife, and provide amenities for the observation of wildlife.

Section 146(d) empowers a local authority, with the consent of the Minister to make grants for the establishment and maintenance of game parks and other related facilities.

Section 147(d) controls the cutting of timber and the destruction of trees and shrubs.

Under section 265(1) of the Act, any officer of a local authority duly authorized in writing shall, on producing, if so required, some duly authenticated document showing his authority, have a right to enter any premises at all reasonable hours for the purpose of ascertaining whether there is, or has been, on, or in connexion with, the premises, any contravention of this Act or of any by-laws, whether made under this Act or any other written law, being provisions which it is the duty of the local authority to enforce.

4.14 The Forests Act (Chapter 375 of the Laws of Kenya.)

This is an Act of Parliament intended to provide for the establishment, control and regulation of Central Forests, forests and forest areas in the Nairobi Area and on unalienated Government Land

Section 6(1) of the Act, the Minister may by notice in the Gazette declare a forest area or a Central Forest or any part thereof to be nature reserve for the purpose of preserving the natural amenities thereof and the flora and fauna therein, and may declare that a nature reserve shall cease to be a nature reserve.

It goes on to provide that in a nature reserve, no cutting, grazing, removal of forest produce or disturbance of the flora shall be allowed except with the permission of the Director of Forestry, and permission shall only be

given with the object of conserving the natural flora and amenities of the reserve.

Further, hunting, fishing and the disturbance of the fauna shall be prohibited except in so far as may be permitted by the Director of Forestry in consultation with the Chief Game Warden, and permission shall only be given in cases where the Director of Forestry in consultation with the Chief Game Warden considers it necessary or desirable to take or kill any species.

There is subsidiary legislation in the form of THE FORESTS (CONTROLLED ENTRY) RULES which provide that no person to whom these Rules apply shall enter into or remain in any of the Central Forests specified in the Schedule, save under and in accordance with the terms of a permit in that behalf issued to that person by a forest officer.

These Rules shall not apply to persons using a public line of travel at any hour or to persons traveling on a road constructed by the Forest Department or its licensees between the hours of 6 a.m. and 7 p.m. unless the road has been closed by a notice or barrier or both.

However, these Rules apply to all persons other than officers of the Government acting in the performance of their duties and employees of the Forestry Department in possession of a valid employment card.

4.15 The Trust Land Act (Chapter 288)

This is an Act of Parliament which makes provision for Trust land. Section 38(1) of the Act provides that a way leave license may be granted to any person empowering him and his servants and agents to enter upon Trust land vested in the council and to lay pipes, make canals, aqueducts, weirs and dams and execute any other works required for the supply and use of water, to set up electric power or telephone lines, cables or aerial ropeways and erect poles and pylons therefore, and to make such excavations as may be necessary for the carrying out of any such purposes, and to maintain any such works as aforesaid.

Section 8 of the Act provides that where land is set apart, full compensation shall be promptly paid by the Government to any resident of the area of land set apart who -

- Under African customary law for the time being in force and applicable to the land has any right to occupy any part thereof; or

- Is, otherwise than in common with all other residents of the land, in some other way prejudicially affected by the setting apart.

Subsidiary legislation is to be found in the form of THE TRUST LAND (WAY LEAVES FOR ELECTRIC LINES) RULES. In these Rules a way leave license granted under section 38(of the Trust Land Act) for the purpose of erecting or laying an electric line over or under land shall be in the form in the Schedule to these Rules, or as near thereto as possible, regard toing had to the circumstances and requirements of each case.

Before granting any such wayleave license, the council shall satisfy itself that compensation in respect of disturbance or of any other loss or expenses likely to be caused by the erection or laying of the electric line has been or will be paid to those concerned in like manner and to the same extent as if the land had been set apart under the Act and as if the compensation were being paid under section 8 of the Act.

No such way leave license shall be valid for a longer period than the period of validity of the relevant license issued under the Electric Power Act.

The annual fee to be paid for such a wayleave license shall be assessed at 25 cents per annum per pole or pylon, or, where the electric line is laid underground, Sh. 5 per mile.

4.16 The Energy Act (Chapter 12)

Section 27 of this Act provides that Subject to the provisions of this Act, a license or licenses as the case may be, shall be required for the generation, importation or exportation, transmission or distribution of electrical energy; or supply of electrical energy to consumers

The Act states that a Permit shall be required in respect of all undertakings -

- Intended for the supply of electrical energy to other persons or consumers; and
- With a generating plant of over 1000 kW intended for own use.

Further, any undertaking operating pursuant to a permit granted under this Act shall in any case where conveyance of electrical energy to or from any transmission or distribution network is possible, meet the minimum requirements of the owner or operator of the transmission or distribution network as approved by the Commission, and the owner or operator of

any such undertaking shall inform the network or operator of all connected load and generation equipment that might have material effect on the network; and shall be subject to such conditions as may be specified by the Commission.

However, a permit shall not be required in the case of installations with a generating plant of a capacity not exceeding 1000 kW and connected within the premises of any person in such a manner that conveyance of electrical energy to a transmission system or a distribution system cannot occur.

Section 43 of the Act provides that all contracts for the sale of electrical energy, transmission or distribution services, between and among licensees, and between licensees and large retail consumers shall be submitted to the Commission for approval before execution.

An application for approval of such a contract shall be submitted to the Commission in such manner, as the Minister may, in regulations prescribe. In considering such a contract, the Commission shall:-

- Ensure that the rates or tariffs established in the contract are just and reasonable;
- Satisfy itself that the application meets the minimum requirements as prescribed by the Minister in the regulations under this Act; and
- Take into account any other issues which may have a bearing on the operations of the undertakings.

Section 46 of the Act states that no person shall enter upon any land, other than his own to lay or connect an electric supply line except with the prior permission of the owner of such land. Such permission shall be sought by way of notice which shall be accompanied by a statement of particulars of entry.

Section 53 of the Act states that for the purpose of the conveyance, transmission, or supply of electrical energy, a licensee may erect, fix, install or lay any poles, wires, electric supply lines, power or other apparatus in, upon, under, over or across any public streets, road, railways, tramways, rivers, canals, harbours or Government property, in the manner and on the conditions as provided in this Act.

Notwithstanding the provisions of any other written law, but subject to the provisions of this section, a licensee may break up any street within his area of supply, and may erect posts and lay or construct power lines or

electric supply lines along, under or over any such street, and may, from time to time, repair, alter or remove any posts or lines so erected, laid or constructed. Provided that the person having the control of such street shall have a prior right to break up and repair such street with reasonable dispatch upon payment to him of a reasonable charge by the licensee.

A licensee shall, not less than thirty days before exercising this power, give notice in writing to the owner of his intention to do so, except in a case of emergency and in such case the licensee shall notify the owner as soon as possible after the emergency has arisen.

The powers conferred upon a licensee by this act shall, except in a case of emergency, be exercised only under the superintendence of the person concerned and according to a plan showing the route and in terms of specifications approved by that person, or, if any dispute arises in respect of such plan, route or specifications, as may be approved by the Commission:

Provided that if the said person fails to exercise the powers of superintendence conferred by this section the licensee may, after giving notice, exercise those powers without superintendence.

Whenever a licensee carries out any work authorized by this act, he shall comply with the by-laws, if any, of the local authority concerned and shall complete that work with reasonable dispatch and reinstate the street broken up and remove any debris or rubbish occasioned thereby and shall, while the street is broken up or obstructed, cause the works to be, at all times, fenced and guarded and during the night, adequately lit.

Section 56 of the Act provides that the licensee shall lay down or erect and keep in good state of repair suitable and sufficient electric supply lines for the purpose of enabling supply to be given in the area of supply specified in that behalf in the license.

4.17 KPLC Land Acquisition Procedure

Low Voltage Power Lines

A reconnaissance survey is first done to search for the best possible route. It's KPLC policy to avoid existing structures as much as possible. Once the best route has been established, a meeting between the KPLC staff, the locals and the local administration is arranged. During this meeting KPLC formally requests for permission to survey the area. Once this is agreed upon, the surveyor moves to site and takes detailed profiles of the area and also places pegs where the poles are to be located. The surveyor then

prepares a cadastral map of the area showing the plot numbers and the route of the power lines as well as the position of the poles.

The Way Leaves Department (Section) of the KPLC then prepares a Way Leaves agreement showing the affected plot and the proposed route. The individual owner is then approached with this proposal and his consent is requested. The owner is compensated for buildings or crops that are on the land. However, the owner is not allowed to grow anything higher than 12 feet within 5 meters of the poles or line.

KPLC also consults with other relevant institutions such as Telkom Kenya, County Councils, Airport Authorities, Kenya Pipeline Corporation, Kenya Ports Authority, Department of Defense, Kenya Wildlife Service, Conservatoire of Forests and Ministry of public works and Housing to ensure that their proposal is in harmony with other proposed developments.

High Voltage Lines

A similar procedure is undertaken in assessing the best route as in the case for the low voltage lines. The land required is of 10 Meters width. Once the best route is established the landowner is approached and with his proposal and his consent is requested. The owner is compensated for the land through negotiations to agree on a compensation rate. The owner is also compensated for buildings or crops that are on the land.

4.18 Kenya Electricity Grid Code & Kenya Safety Code

The Kenya Electricity Grid Code sets out detailed arrangements for the regulation of the Kenyan electricity supply industry and is enforceable under the Electric Power Act (No. 11 of 1997)

The Kenya Safety Code recognizes the Factories Act (1962) which requires an employee to use any means or appliance provided by the employer for securing safety and also willfully to do anything to endanger himself or others.

4.19 The Public Health Act (Cap. 242)

Environmental degradation may pose a health hazard to the general public. This is among the factors considered by the Public Health Act to constitute “nuisance”. For the interpretation of the Act, Section 15 (IX) indicates that any noxious matter or wastewater discharged from any premise, such as a building constitutes nuisance. Any premise not kept in

a clean and free from offensive smell such as gases which are injurious to health such as those from commercial establishments shall therefore generate nuisance. The Act therefore stresses that no person shall cause a nuisance to exist on any land or premise occupied by him. Because of the above, the Act acknowledge that it shall be the duty of all local authorities to take all lawful measures for maintaining its district at all times in a clean and sanitary condition for remedy of any nuisance or condition liable to be injurious to health. To safeguard against this, Part X of the Public Health Act states that where in the opinion of the Medical Officer of Health that food stuffs within a warehouse, or a building are insufficiently protected, the owner shall be compelled to observe the require regulations, else he shall be guilty of an offence.

4.20 The Penal Code (Cap. 63)

The chapter on “Offences Against Health and Conveniences” contained in the Penal Code enacted in 1930 strictly prohibits the release of foul air into the environment, which affects the health of other persons. Any person who voluntarily violates the atmosphere at any place, to make it noxious to health of persons in general dwelling or carrying out business in the neighbourhood or passing along public ways is guilty of misdemeanour, i.e. imprisonment not exceeding two years with no option of fine. Under this code, any person who for the purpose of trade or otherwise makes loud noise or offensive awful smell in such places and circumstances as to annoy any considerable number of persons in the exercise of their rights, commits an offence, and is liable to be punished for a common nuisance, i.e. imprisonment not exceeding one year with no option of fine.

4.21 The World Commission on Environment and Development

The Commission commonly referred to as “the Brutland Commission” focused on the environmental aspects of development, in particular, the emphasis on sustainable development that produces no lasting damage to biosphere, and to particular ecosystems. In addition, environmental sustainability is the economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainable development maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for

health and well-being, adequate nutrition, and shelter, cultural expression and political involvement.

4.22 The Rio Declaration

Agenda 21 - a programme of action for sustainable development worldwide, the Rio Declaration on Environment and Development was adopted by more than 178 governments at the United Nations Conference on Environment and Development, known as the Earth Summit, held in Rio de Janeiro, Brazil from 3rd to 14th June 1992. Principle No. 10 of the declaration underscores that environmental issues are best handled with participation of all concerned citizens at all the relevant levels. At the national level, each individual shall have appropriate access to information that is concerning environment that is held by public authorities. States shall encourage and facilitate public participation by making information widely available.

Effective access to judicial and administrative proceedings, including redress and remedy shall be provided. The foregoing discussion is relevant to the proposed development because EMCA demands that public must be involved before any development project that is likely to have adverse impacts to the environment is initiated by a proponent. The Act has further established Public Complaints Committee (PCC) where the issues raised by the public in regard to any proposed development can be addressed.

4.23 Sessional Paper No. 6 of 1999 on Environment and Development

Every person in Kenya is entitled to a clean and healthy environment and has a duty to safeguard and enhance the environment. As envisioned in Sessional Paper No. 6 of 1999 on Environment and Development, Kenya should strive to move along the path of sustainable development to meet the needs of the current generation without compromising the ability of the resource base to meet those of future generations. The overall goal is hence to integrate environmental concerns into the national planning and management processes and provide guidelines for environmentally sustainable development. The policy paper emphasizes that environmental impact assessment must be undertaken by the developer as an integral part of a project preparation. It also proposed for periodic environmental auditing to investigate if developer is fully mitigating the impacts identified in the assessment report.

4.24 The National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in 1994. It was a deliberate policy to integrate environmental considerations into the country's social and economic development process. The integration was achieved through a multi-sectoral approach and a comprehensive framework to ensure that environmental management and conservation of natural resources is an integral part of societal decision-making process.

4.25 The Poverty Reduction Strategy Paper (PRSP)

The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya's commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without the participation of the poor themselves. The proposed project, during and after implementation, will offer jobs to many Kenyans as a way of contributing to this noble objective of reducing poverty.

5.0 NATURE AND DESIGN COMPONENTS OF THE PROJECT

5.1 Project scope

The Power generated at Lake Turkana wind farm will be transmitted through a proposed alignment that run from Lake Turkana at Loyangalani, South Horr, Baragoi, Marti, Morijo, Poro, Losuk, Longewan, Lonyek, Almiran, Rumuruti, Ndaragwa, Shamata, Rudisha, Olmogogo, Turasha, Maraigishu, Maguna, Kijabe Hill, Longonot, to Suswa, at total of 440km from the source. Figure 1 represents the proposed transmission line route. At Suswa, the generated power will linked to the existing main electricity grid from Olkaria.

5.2 Materials and equipment

The proposed power transmission line project as with other projects will utilise a variety of materials to ensure completeness. Following are the key raw materials input to be expended in the realization of the project objectives

Substations

The voltage required for economical transmission of electric power exceeds the voltage appropriate for distribution to customers. First, customer equipment generally operates at only a few hundred volts, rather than at the hundreds of thousands of volts used for transmission. Second, if high voltages were maintained up to the point of customer connection, fault protection would be extremely expensive. Therefore, distribution from the transmission line to customers is accomplished at much lower voltages, so transformers are required to reduce voltage before the power is introduced to a distribution or sub transmission system. These transformers mark the end of the transmission line and are located at substations. Each transmission line starts from an existing substation and ends at a new substation.

For the proposed project, construction of transmission and terminal substation will include both electro-mechanical and civil works. Materials and equipment to be used will include:-

- Cement, Course aggregates and fine aggregates for all mass and reinforced concrete works
- Hand dressed natural stones
- Precast concrete poles
- Chain link

- Crushed stone (hard core)
- Paving blocks to be laid on main drainage and ducting channels
- Steel gate
- Step-up and step-down transformers
- Circuit breakers
- Surge arrestors
- Current transformers
- Voltage transformers
- Control panels
- Bus bars and control cables
- Batteries and battery chargers

Transmission towers

Transmission towers support the conductors and provide physical and electrical isolation for energized lines. The minimum set of specifications for towers are the material of construction, type or geometry, span between towers, weight, number of circuits, and circuit configuration. At 400 kV, the material of construction is generally steel, though aluminum and hybrid construction, which uses both steel and aluminum, have also been used. The type of tower refers to basic tower geometry. The options are lattice, pole (or monopole), H-frame, guyed-V, or guyed-Y. The span is commonly expressed in the average number of towers per kilometer. This value ranges from 2 to 4 towers per mile. The weight of the tower varies substantially with height, duty (straight run or corner, river crossing, etc.), material, number of circuits, and geometry. The average weight of for 400-kV lines 10000 kg. The type of tower (specific tower geometry) is very site-dependent, and, for any given conditions, multiple options are likely to exist. The circuit configuration refers to the relative positioning of conductors for each of the phases. Generally the options are horizontal, vertical, or triangular. The vertical orientation allows for a more compact right of way, but it requires a taller tower.



Plate 1: Typical lattice High voltage transmission tower
Construction of power transmission towers will entail:

- **Site Clearance**

Clearing of the way leaves can employ a variety of techniques, including the use of heavy equipment, such as dozers and scrapers, or selective hand-clearing. The choice depends upon topography, current growth, land use, and plant species on wayleave adjacent property and the presence of sensitive environments. In sensitive areas, hand-clearing may be used to minimize environmental disturbance.

However, even with careful practices, habitat may be changed by way-leaves clearing, especially if it results in substantial changes to the original vegetation cover. Changes may extend to the area adjacent to the way-leave, which is subsequently exposed to increased sunlight or other changes. This is particularly true in the case of an interruption in an otherwise continuous forest cover. Changes in drainage patterns may be an important consideration, especially if the way-leave is adjacent to a body of water. Where a crossing is required, there is further risk of impact to the body of water and its aquatic species, since these are dependent on the bordering wetlands that must also be crossed. Erosion at the points of crossing introduce soil particles, increasing sedimentation and the associated clouding of water.

- **Excavation of the holes and concrete of the foundation**

Depending on the nature of the terrain and materials, different methods of excavation may be used in digging holes on which transmission towers are erected. These include use of heavy earthmoving equipment such as excavators. Rock drills are utilised in areas with rock outcrops and clay hard pans while manual excavation comes in areas with less compact ground material.

- **Erection of towers**

Tower erection entails assembly of fabricated members by use of various jointing thuds such as bolting and welding. Hoisting equipment as hoisting crane may be employed in raising materials as the tower height increases.

- **Stringing of Conductors**

The process of attaching conductor wires to the insulators suspended from the towers is called conductor stringing. It involves pulling the conductor off a truck-mounted spool. This process typically will not result in additional land disturbance beyond that required for tower construction. An exception may occur at diversion towers where severe line direction changes occur.

For the proposed power transmission line, the materials to be utilised in executing this work include:-

- Aluminium conductors
- Galvanised steel sections
- Anchor bolts
- 400KV power cables
- Line insulators

5.3 Project Outputs

On its completion, following are the main outputs from the project:

- 400km of 400 KV power transmission line running from Loyangalani in Marsabit to Suswa connected to the double circuit transmission line running from Olkaria
- A power transmission substation at Loyangalani
- A terminal substation at Suswa

5.4 Project budget and timeline

Initial estimates by the proponent indicate that the total project cost will be in the tune of USD 150 million which include cost of materials, professional fees, compensation of the affected households and labour cost. Further, the proponent envisage project construction time of about 18 months.

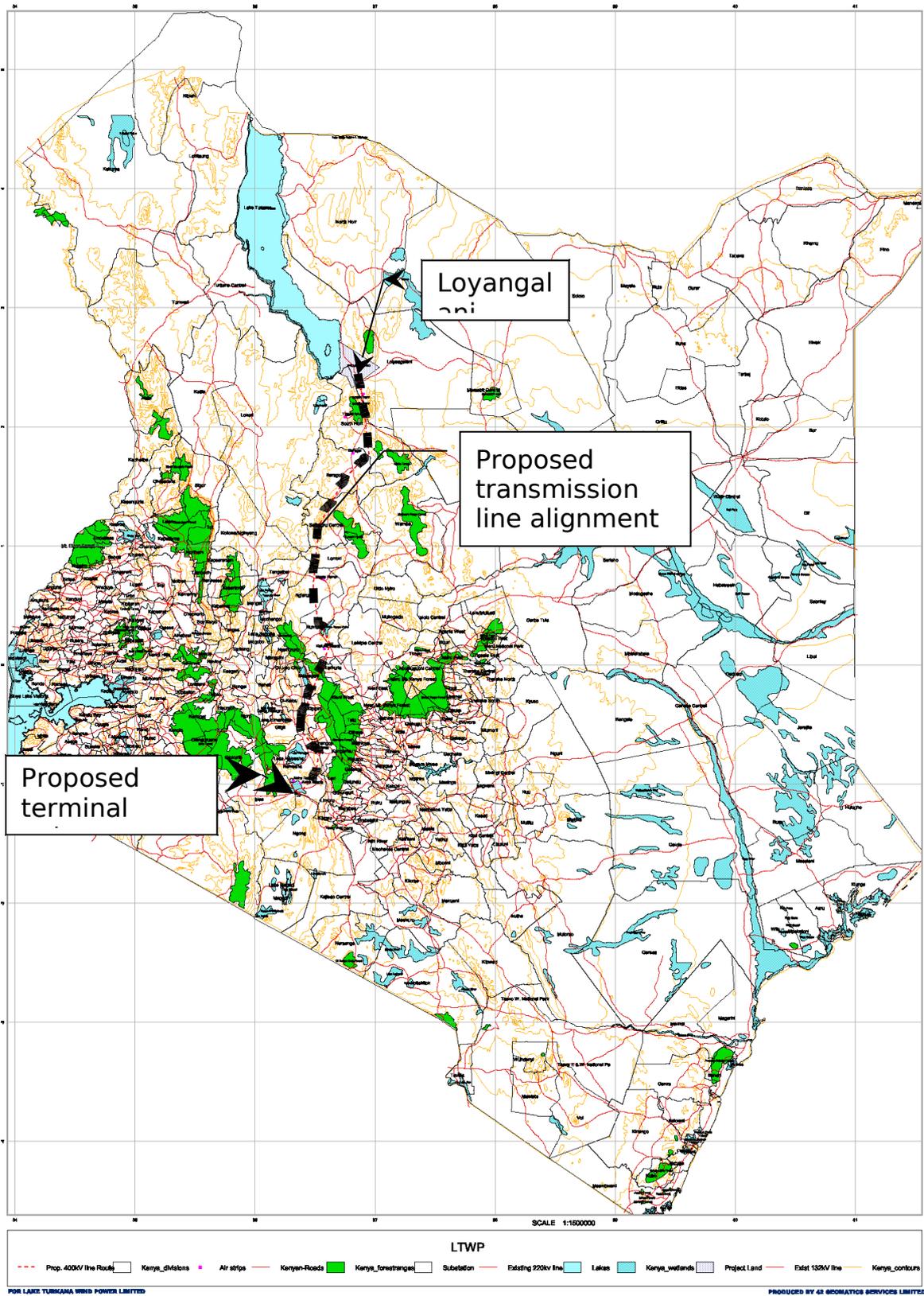


Figure 1: Project location map

6.0 POTENTIAL ENVIRONMENTAL IMPACTS

6.1 Overview

Completion of the proposed power transmission line and attendant substations may impact the environment and the social well being of the way-leave trace and the neighbouring areas in a number of ways. These impacts can be either positive or negative and varying magnitude.

6.2 Anticipated Environmental Impacts

During the field survey, the environmental and social-economic impacts relating to the proposed project were identified. They were obtained by making physical observations along the proposed transmission line corridor and proposed site for the terminal substation as well as information obtained from stakeholders during consultative meetings.

The magnitude of each impact is described as significant (major), moderate (minor) or insignificant. Insignificant impacts have no long-term consequences (positive or negative), and are regarded as being minor. But those with long-term repercussions are classified as significant. Using an impact matrix, the anticipated environmental impacts for the project have been presented in Table 2.

6.2.1 Impacts during Construction Process

1) Positive Impacts

A proportion of the project cost will be reflected in employment of professional services such as detailed engineering survey and detailed design.

The informal sector will benefit from the operations of the proposed residential development. This involves kiosk owners who have been selling food to workers all along the corridor traversed by the proposed line. Further, there are employment opportunities especially to casual workers in clearing of the way-leave corridor during detailed engineering and construction phases.

Employment opportunities are of a benefit from both social and economic perspectives. From economic perspective, abundant unskilled labour is being used in economic production, on the other hand, from social perspective, the labourers are engaged in productive employment other than remaining idle, hence avoiding social vices such as drug abuse and robberies among others.

Apart from casual labourers, semi-skilled and skilled labour, professionals such as electrical and structural engineers among

others have obtained gainful employment during the period of construction. There are gains in the local and national economy through consumption of locally available materials including, concrete, timber and cement.

Table 2 Detailed Impact Matrix for the proposed High Voltage transmission line during surveying and construction phases

Potential Impacts	Positive Impacts			Negative Impacts		
	Insignificant (Minor)	Moderate	Significant (Major)	Insignificant (Minor)	Moderate	Significant (Major)
Proliferation of uncollected solid and hazardous/toxic wastes						
Inadequate disposal of human waste during construction phase						
Loss of vegetation, important flora and fauna						
Disturbance of soils and increased erosion						
Increased cases of Sexually Transmitted Infections						
Air pollution generated by dust during construction						
Noise pollution generated by construction activities						
Workers accidents during construction						
Mushrooming of food kiosks						
Displacement of locals						
Social cultural Conflicts						
Creation of employment opportunities						
Increase business activities in market centres along the						

proposed transmission line						
Opening up of the remote areas through enhanced access roads						

2) Negative Impacts during construction

- **Hazardous wastes**

Following is a list of hazardous materials that are typically used in transmission line construction.

2-cycle oil (contains distillates and hydrotreated heavy paraffinic)
ABC fire extinguisher
Acetylene gas
Air tool oil
Ammonium hydroxide
Antifreeze (ethylene glycol)
Automatic transmission fluid
Battery acid (in vehicles and in the meter house of the substations)
Bottled oxygen
Brake fluid
Canned spray paint
Chain lubricant (contains methylene chloride)
Connector grease (penotax)
Contact Cleaner 2000
Diesel fuel
Diesel fuel additive
Eye glass cleaner (contains methylene chloride)
Gasoline
Gasoline treatment
Hot stick cleaner (cloth treated with polydimethylsiloxane)
Hydraulic fluid
Insect killer
Insulating oil (inhibited, non-PCB)
Lubricating grease
Mastic coating
Methyl alcohol
Motor oils
Paint thinner
Propane
Puncture seal tire inflator
Safety fuses
Starter fluid
Sulfur hexafluoride (within the circuit breakers in the substations)
Wasp and hornet spray (1,1,1 trichloroethene)
WD-40
ZIP (1,1,1-trichloroethane)
ZEP (safety solvent)

- **Inadequate Disposal of Human Waste**

Lack of a toilet at the construction site is likely to encourage poor disposal of human waste, especially by the construction workers. This is foreseen a major public health concern.

- **Workers Accidents During Construction**

There is possibility of workers' accident during the construction phase arising from the activities and machinery involved. This could be fatal or lead to serious injuries if the proponent has not developed a comprehensive accident control and management plan prior commencement of the next phase of construction.

- **Air Pollution**

There is likely to be pollution in terms of noise and dust during the project's construction phase. This is likely to be from construction vehicles serviced and/or attended at the project site.

- **Loss of Vegetation cover**

The construction process will involve clearing of existing vegetation cover along the entire corridor 400km where such vegetation exists. The way-leave trace is expected to be 80m and in case vegetation is to be cleared in areas serving as habitats will lead to disruption of life for small mammals such dik diks, In the long-term, this is likely to change the microclimate of the area.

- **Soil Disruption**

The proposed project will involve excavation of holes in which the power transmission pylons are to be anchored. The average depth of such hole ranges between 1.5m on areas with high bearing capacity stable areas and could be as deep as is technically feasible in areas with unsuitable ground. This will occasion disruption of soils in the affected areas.

- **Displacement individuals (Demolition of houses)**

This is an inevitable impact given that there is no clearly unoccupied land between the generation point and terminal point of the proposed power transmission line. Individual households will be displaced to give way to construction of the line in areas where the line traverses for the entire 400Km way-leave trace. This in essence could lead to weakening of the social fabric in areas where people living together for a long time have to be relocated to start their lives again in a different part.

- **Socio- Cultural conflict**

It is highly unlikely that the whole project will be constructed using local labour. In this regard therefore, migrant workers from different cultural background are likely to be hired to perform specialized works whose skills are no available in the local pool. The presence of migrant workers from different cultural backgrounds, there could

arise conflicts with the local cultures. The lifestyles of the migrants may not be compatible with those of the hosts and these could cause frictions.

- **Power supply interruptions**

There are a number of areas where the proposed power transmission line will cross over existing HV transmission lines to key towns such as Maralal. The proposed 400KV line will be stringed above these lines. During the construction phase, the existing power line will have to be switched off for some time to allow stringing of the proposed line. This in effect will lead to power supply interruptions in the towns occasioning economic loss for businesses depending on electric power.

- **Increased cases of Sexually Transmitted Infections (STIs)**

Due to the influx of migrant workers and the resulting changes in sexual behaviors, there is a chance of escalation of STI's including the deadly HIV/AIDS. There could also be cases of unwanted pregnancies as the migrant workers interact and get into relationships with the local communities.

6.2.2 Impacts during Operational Phase

Positive impacts

- **Addition of more power to the National Grid**

Currently, the country is experiencing a power shortage occasioned by a sustained rising demand for industrial, commercial and domestic consumption. The proposed wind power project is expected to inject a total of 300MW equivalent to 25% of the power available in the country at the moment .The additional power is not only expected to promote/spur rapid economic growth but also reduce power tariffs since it has been shown from the feasibility study that the unit production of power using wind from the project will cost 50% less than the current fossil fuel generated power by the other IPPs in the country.

- **Employment Generation**

The project will result in the generation of employment opportunities during operational phase. This will involve security personnel, Line patrol teams and operation and maintenance team among others. Availability of more and cheaper power is a catalyst

of development of small and medium enterprises which as a result generate employment opportunities at different levels.

- **Individual Investment**

Economically, the project will be an investment to the proponent. The proposed project once complete and operational will earn the proponent income from sale of power to KPLC.

3) Negative Impacts during operation phase

- **Possibility of fatal accidents through electrocution**

It was established that in some of the areas traversed by the proposed power line which experience intercommunity rivalry manifested in periodic cattle raids and other attacks, locals use high points as observatory points to monitor movement of their adversaries. Past experience indicate that in absence of hills and tall trees, in the vicinity, power line poles are used as observatories oblivious of the danger they pose. This has had fatal consequences in most of the cases. Thus this is a possible impact in the areas in question. There has also been an increase cases of transformer oil and Aluminium conductor theft in various parts of the country and this has resulted into a number of fatal electrocution accidents. This could happen in the proposed project.

- **Noise**

In substations, loaded transformers and overhead transmission lines will produce noise. The noise is characterized by a constant humming sound incase of a loaded transformer or crackling sound in the case of high voltage transmission lines. The noise produced by both transmission lines and substations under normal circumstances does not pose any health hazard and it is acceptable to the human ear and wild life.

- **Waste generated**

After commissioning of the power line, there is the possibility of oil spills during servicing of transformers at the substations during normal operations. Strict observance of operation and maintenance procedures can prevent occurrence of oil spills during refilling.

6.2.3 Impacts during Decommissioning Phase

a) Decommissioning of transmission lines and substations

During the decommissioning phase, the wastes that were used in construction process, if not collected and safely disposed off are likely to pose environmental problems. In the same breath, key equipment used along the transmission line and the substations including transformers, circuit breakers, current and voltage transformers will be put out of service. It is of essence that precaution be taken to avoid spillage of oil from electrical appurtenances during this phase.

b) Decommissioning at the end of Project Lifespan

If at the end of the project life span the power transmission line and the attendant substations are to be removed from service by way of demolition, then decommissioning stage will have to address two primary issues related to environmental impacts of disassembly, dismantling and demolishing of all the components of the transmission line and substations. These include:

- ⊖ Prevention of accidents during the decommissioning phase
- ⊖ Minimizing waste disposal through reuse and recycling and
- ⊖ Properly handling hazardous and regulated materials.

In addressing the first issue deconstruction of the power line and of substation is usually undertaken. Deconstruction is the manual dismantling of a building so materials can be salvaged for reuse.

- Mitigating against noise and dust by either manually disassembling the major portions of the existing structures, as discussed above
- All demolition debris will be handled with care to avoid material being blown by the wind from the proposed site of development to the surrounding environment. All debris should be packaged and transported to appropriate disposal site following established county council and NEMA waste management procedures.
- All demolition work shall be carefully executed with the particular aim of preserving the items being removed. All materials, components and fittings arising from the demolitions shall become the property of the contractor as a way of reducing the disposal cost of existing old buildings.

- The method of demolition used shall be in line with all laws and by-laws governing such activities. In particular, the contractor will be required to protect the adjacent properties, users / workers and the public from any nuisance in form of noise and dust, and from falling objects. The contractor shall also take all necessary measures to prevent any damage or loss to third party.
- Before embarking on demolition, the contractor shall give all the necessary notices as required by law.
- An attempt shall be made to limit the quantity of materials removed from site or sent to landfill through reuse of the debris in the construction and landscaping stage.
- Re-sell or reuse reclaimed materials to reduce the cost of new materials and where possible minimize the projects overall environmental impact through reuse and recycling.

Table 3 presents the anticipated environmental impacts during the decommissioning of the proposed power transmission line and substations after the expiry of the project's lifespan -

Table 3 Anticipated Environmental Impacts and Mitigation Measures at Decommissioning of project

Undesirable Impacts	Mitigation Measures	Responsibility for Mitigation
<p>1. Air pollution during demolition process.</p>	<ul style="list-style-type: none"> ✓ The demolition exercise will be limited at day time only ✓ All personnel working on the project will be trained prior to commencing the demolition exercise on methods for minimizing negative impacts on air quality. ✓ Construction vehicle drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon and minimize idling of engines. ✓ All active demolition areas will be watered at least twice a day to reduce dust. ✓ All trucks hauling demolition debris/wastes shall be covered. ✓ Careful screening to contain and arrest demolition related dust will be adopted ✓ Exposed demolition debris of e.g. dust and sand, will be enclosed, covered, and watered daily before transported to disposal site. ✓ All workers on the site will be required to wear protective clothing while on duty 	<ul style="list-style-type: none"> ✓ Project proponent ✓ NEMA inspectors
<p>2. Noise pollution by disassembly activities.</p>	<ul style="list-style-type: none"> ✓ Portable barriers will be installed to shield compressors and other small stationery equipment where applicable. ✓ Use of equipment designed with noise control elements will be adopted where necessary. ✓ Trucks used during demolition exercise on site shall be routed away from noise sensitive areas in the neighbourhood, where feasible. ✓ Sound barriers are to be installed for pile driving activities. ✓ Idling time for pick up trucks and other small equipment will be minimized to limited time. ✓ Use of very noisy equipment will be limited to daytime only. ✓ All workers operating in noisy areas or operating noisy equipment 	<ul style="list-style-type: none"> ✓ Project proponent ✓ NEMA inspector

	<p>will be provided with earpieces to protect against extreme noise.</p> <ul style="list-style-type: none"> ✓ The demolition exercise will be limited at day time only 	
<p>3. Proliferation of uncollected demolition debris and related wastes</p>	<ul style="list-style-type: none"> ✓ Private contractor will be engaged to collect demolition debris/wastes ✓ All debris/wastes to be collected regularly to control air pollution and injury etc ✓ A licensed operator to avoid illegal final dumping at unauthorized sites will collect demolition debris. ✓ All persons involved in refuse collection shall be in full protective attire. 	<ul style="list-style-type: none"> ✓ Project proponent ✓ NEMA inspectors

Undesirable Impacts	Mitigation Measures	Responsibility for Mitigation
<p>4. Workers accidents during demolition process.</p>	<ul style="list-style-type: none"> ✓ All workers will be sensitized before the exercise begins, on how to control accidents related to the demolition exercise ✓ A comprehensive contingency plan will be prepared before demolition begins, on accident response. ✓ Adherence to safety procedures will be enforced at all stages of the exercise ✓ All workers, pursuant to labour laws, shall be accordingly insured against accidents. ✓ All workers will be instructed to wear protective clothing during demolition, including helmets. ✓ Demolition work will be limited to daytime only avoid workers accidents due to poor visibility ✓ Provision of mobile clinics 	<ul style="list-style-type: none"> ✓ Project proponent ✓ Provincial Public Health Officer ✓ Ministry of Labour ✓ NEMA inspectors

6.3 Stakeholder Consultation

During the field survey for the proposed High voltage transmission line, public consultation formed the component of the survey. This was done pursuant to the Environmental Management and Coordination Act (EMCA) of 1999. Various methods of data collection were used in the survey including:-

- **Questionnaires**

The Consultant developed four different types of questionnaires which were administered to different stakeholders namely; individual members, community leaders, institutions such as schools local authorities and specific key informants such as Kenya Forest Services (KFS) and Kenya Wildlife Services (KWS). Questionnaires/interview schedules were randomly administered to the locals within the area to be traversed by the proposed line.

Data captured from individual members included family size, level of education, prevalence of diseases, house typology, economic activities, sources of water and land tenure system. Individual members also provided data on the anticipated impacts of the proposed power line on the public health, agricultural production and livestock production.

By responding to the questionnaires administered, community leaders provided brief history on how the communities settled in specific areas and details on the organisation of the communities. Further, the leaders highlighted key areas of interest to the communities that may be interfered with by the implementation of the project.

- **Public meetings(Barazas)**

The Consultant organised a number of public meeting in different areas along the proposed transmission line corridor. The public meetings were held between 11th June 2008 to 21st June 2008. Table 1 represent a schedule of the meetings held along the corridor. The meetings were organised in consultation with key leaders in the areas under consideration and conducted inline with the programme attached in Appendix 5-1.

Table 1 Schedule of public meetings held for the proposed transmission line from Loyangalani to Suswa

S/No.	Date	Venue of Meeting
1.	11/06/08	Suswa Centre

2.	13/06/08	Longewan Centre
3.	14/06/08	Loosuk Centre
4.	14/06/08	Porro Market
5.	14/06/08	Longonot Chie'f Camp
6.	14/06/08	Lereshwa Shopping centre
7.	14/06/08	Kabati Shopping centre
8.	15/06/08	Morijo Market
S/No.	Date	Venue of Meeting
9.	16/06/08	Baragoi Ngilai market
10.	17/06/08	Warukira Market
11.	17/06/08	South horr
12.	18/06/08	Mt Kulal Gatab
13.	20/06/08	Kinaba shopping centre
14.	21/06/08	Matigari centre
15.	21/06/08	Marti

Sample of photographic evidence of the meetings held at Shamata, Matigari centre, Lereshwa, Porro, Morijo market and Samburu County Council are shown in Plates 2 to 7. Lists of the Public meeting attendants are presented in Appendices 5-1 to 5-16.



Plate 2: Public consultation meeting at Shamata chief's office- Nyandarua South



Plate 3: Public consultation- Matigari village Mutaara Location of Rumuruti Division



Plate 4: Lereshwa centre Public consultation meeting



Plate 5: Public Consultation at Poro Market

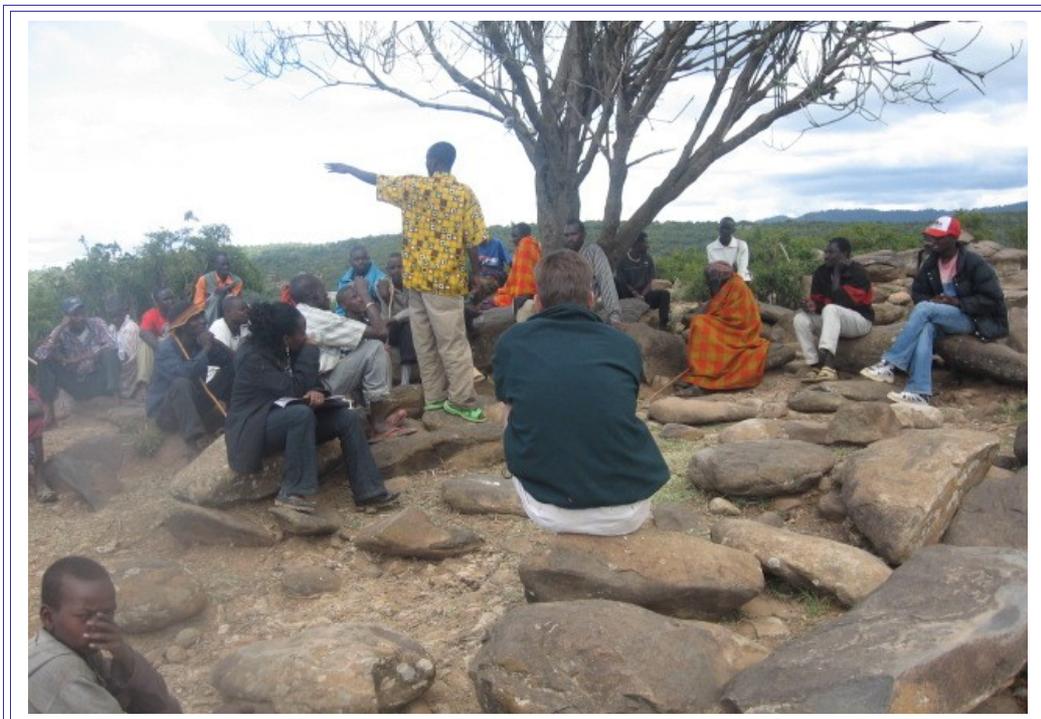


Plate 6: Public Consultation meeting at Morijo market Baragoi



Plate 7: Consultation meeting with the Samburu County Council officers

6.4 Key issues raised during public Consultation

Having been properly informed of the scope of the project, the community members individually or through their representatives raised a number of issues and expectations pertaining to the proposed project. The issues captured include:-

- **Cultural and religious issues**

There are sites near the proposed power transmission line corridor that are of cultural and religious significance to Rendille and Samburu communities. While the proposed project does not traversed directly over these areas, it passes so close near and it is important that the line be moved to avoid future conflict. These sites are:

1. Near Salima – Rendile Community Cultural festivals to mark generation celebration while they water their animals at Lake Turkana. Watering animals after certain duration of time is believed to be curative.
2. At Mt Ngiro – Samburu community believes their god lives in those mountains and also forms the sites for cultural festivals

known as Mugget where each Samburu generation marks its entry into the wider society through sacrifices. The mountain also forms major water catchments and sources of water for the river in South Horr

- **Conflicts with existing facilities**

Two air strips at South Horr lie too close and within the threshold of the plane take off or landing. The two air strips are used by missionaries, government officials local and international military offering community services. There may therefore be a need to realign the proposed transmission route to the eastern side at South Horr.

- **Social -Economic issues**

Following are the social-economic issues raised in all the areas by the various communities included

1. Timely compensation of land, building and any loss occasioned by the construction of the power line
2. Employment of locals in the execution of the project
3. Possibility of provision of power to address some of the biting power problems in the areas to be traversed by the power line
4. Consideration by the proponent to provide some social amenities as such as schools, dispensaries and water.

6.4 Summary

From the foregoing, it is noted that:

- No serious and adverse objections were received from the communities occupying the entire corridor. This confirms that the project is suitable for the local area.
- Consultation with KWS officials in the Mt Kenya and Central Rift Conservation areas indicated that the proposed line does not have negative impact on the wildlife, environment, dispersal areas, habitats and migratory route of wild animals. They however emphasized the need to have security provided to the teams to be charged with the implementation of the project.
- The proposed project has actively involved the key stakeholders who did not object the development.

- The proposed project does not pose adverse environmental impacts, and is an initiative towards increasing the overall national power capacity by 25% from renewable sources

7.0 HEALTH, SAFETY AND ACCIDENT PREVENTION PLAN

7.1 Site Organization

To ensure health and safety conditions and prevent accidents along the proposed transmission line corridor and substation sites, efforts will be made to have a construction and post construction organization plan. These include:

- Developing a clear site organization plan and construction schedule
- Delivery and storage of material at appropriate locations
- Right size of staff/workers with clear work schedule and appropriate dress gear
- Control staff and vehicle movement on site and keep out unwanted persons
- Site offices with safety kit
- Site toilet
- Adequate water supply for both construction work and worker use.

7.2 Project Team

An appropriate project team for the project consists of the following:-

- Project director
- Structural Engineer
- Electrical Engineers
- Land Surveyor
- Mechanical engineers
- Skilled Labourers
- Semi skilled labourers

7.3 Activities of Workers

The following activities by workers are clearly identified and must be closely monitored and organized to ensure health, safety and accident standards on site :

- Excavation using pick axes and shovels. Alternatively mechanised excavation using JCB excavator
- Batching and Manual or mechanical mixing of concrete
- Where the site conditions are adverse, piling of the piling hammer and accessories

- Bolting, jointing and welding of steel sections where necessary
- Hoisting of steel sections
- Bending, cutting and laying of reinforcement steel
- Welding and bolting of steel sections in tower erection
- Other general building work activities.

7.4 Activities by Machinery and Equipment

The activities of machinery and plant must also be properly organized and monitored in order to ensure health and safety conditions and prevents accidents. The machinery and plant to be used on site include

-

- Compacting machine
- Vibrators
- Concrete mixer
- Goods truck
- Trucks
- Tension stringing equipment
- Hydraulic mobile crane
- Ready mix trucks
- Piling rigs and accessories where necessary
- JCB excavators

8.0 ENVIRONMENTAL MANAGEMENT PLAN

8.1 Introduction

Integrating environmental issues in business management, such as those related to real estate development is that it increases efficiency while enhancing the companies' financial and environmental management. These issues, which are normally of financial concern at company level, are costs, product quality, investments, level of productivity and planning.

Environmental planning and management as a concept seeks to improve and protect environmental quality for both human and animal habitats through segregating activities, which are environmentally incompatible. Environmental management plan (EMP) for development projects is aimed at providing a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, EMP assigns responsibilities for action to various actors, and provides time frame within which mitigation measures can be done.

EMP is a vital output for an environmental impact assessment as it provides a checklist for project monitoring and evaluation. A number of mitigation measures have already been incorporated into the project design.

Table 4 has addressed the identified potential negative impacts and mitigation measures of the proposed High Voltage transmission Line and substations

8.2 Environmental Monitoring and Evaluation

Environmental monitoring and evaluation are essential in project's lifespan as they are conducted to establish if the project implementation has complied with the set environmental management standards as articulated in the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, and its attendant Environmental (Impact Assessment and Audit) Regulations, 2003.

In the context of the proposed project, design has made provisions for an elaborate operational monitoring framework for the following among others:

- Disruption of natural environment and modification of microclimate
- Air and noise pollution
- Workers accidents and health infections during construction process
- Compensation fro demolition of structures and use of land
- Proliferation of uncollected wastes

Table 4: Environmental Management Plan Matrix for the proposed power transmission line and substations

Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Means for Monitoring	Frequency for Monitoring	Estimated Cost (Kshs)
Air pollution by dust generated during construction process.	<ul style="list-style-type: none"> ⊕ All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. ⊕ Construction heavy earth moving vehicle drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon and minimize idling of engines. ⊕ Careful screening of construction site to contain and arrest construction-related dust. ⊕ Exposed stockpiles of e.g. dust and sand, will be enclosed, covered, and watered daily, or treated with non-toxic soil binders. ⊕ All workers on the site will be required to wear protective clothing while on duty. 	<ul style="list-style-type: none"> ⊕ Project proponent/contractor ⊕ Ministry of Health: provincial public health officer ⊕ NEMA inspectors ⊕ Ministry of Labour 	Periodic Activities	Periodic and surprise checks	100 000 per month over the construction period

<p>Pollution from Hazardous waste</p>	<ul style="list-style-type: none"> ⊕ Handling of the materials using the material safety data provided by the manufacturers ⊕ Appoint a safety officer to ensure that proper disposal guideline are observed ⊕ Ensuring that maintenance and/ or piece of work carried out on any piece of equipment or construction work is undertaken by qualified personnel ⊕ In case of spillage emergency spillage control measures to be instituted ⊕ Containerization of any wastes and disposal through a licensed waste handler. 	<ul style="list-style-type: none"> ⊕ proponent/contractor ⊕ Ministry of Health: provincial public health officer ⊕ NEMA inspectors 	<p>Periodic inspection</p>	<p>Periodic and surprise checks</p>	<p>100 000 per month</p>
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Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Means for Monitoring	Frequency for Monitoring	Estimated Cost (Kshs)
Noise pollution by construction activities.	<ul style="list-style-type: none"> ⊕ Use of equipment designed with noise control elements will be adopted where necessary. ⊕ Trucks used at construction site shall be routed away from noise sensitive areas where feasible. ⊕ Idling time for pick up trucks and other small equipment will be minimized to limited time. ⊕ All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise. 	<ul style="list-style-type: none"> ⊕ Project proponent/contractor ⊕ Divisional Public Health Officer ⊕ Ministry of Labour ⊕ Workers ⊕ NEMA inspectors 	Routine Activities	Periodic and surprise checks	40 000 per month over the construction period
Workers accidents and hazards when handling hazardous wastes.	<ul style="list-style-type: none"> ⊕ Adequate collection and storage of waste will be provided on site, and safe transportation to, and display methods at designated areas. ⊕ All receptacles for storing hazardous wastes shall be adequately covered. ⊕ All employees will be required to wear protective clothing when handling hazardous wastes. ⊕ All workers will be adequately insured against unforeseen accidents. 	<ul style="list-style-type: none"> ⊕ Project proponent/contractor ⊕ Provincial Public Health Officer ⊕ Ministry of Labour ⊕ Workers ⊕ NEMA inspectors 	Routine Activities	Periodic and surprise checks	50 000 per month

Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Means for Monitoring	Frequency for Monitoring	Estimated Cost (Kshs)
Uncollected solid waste.	<ul style="list-style-type: none"> ⊕ Wastes to be collected regularly to control air pollution and vermin/insects etc. ⊕ Receptacles will be provided for waste storage prior to collection. ⊕ Resource recovery will be encouraged once the project takes off so as to shrink waste stream and recover non-recyclables. ⊕ Refuse collection vehicles will be covered to prevent scatter of wastes by wind. ⊕ Wastes will be collected by a licensed operator to avoid illegal final dumping at unauthorized sites. ⊕ All persons involved in refuse collection shall be in full protective attire. 	<ul style="list-style-type: none"> ⊕ Proponent ⊕ Hired private contractor ⊕ Provincial Public Health Officer ⊕ NEMA inspectors 	Routine Activities	Periodic and surprise checks	10 000 per month
Visual Intrusion and obstruction	<ul style="list-style-type: none"> ⊕ Power transmission pylons to be erected away from residential areas ⊕ Avoidance of numerous angle points during construction 	<ul style="list-style-type: none"> ⊕ Contractor ⊕ Proponent 	Sound design with limited angle points	Quality control during design and implementation phase	Part of design cost

Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Means for Monitoring	Frequency for Monitoring	Estimated Cost (Kshs)
Danger of accidents from electrocution	<ul style="list-style-type: none"> ⊕ Sensitisation of the locals of the dangers of tampering or high voltage lines ⊕ Provision of warning sign on the transmission towers ⊕ Provision of cordoning of the pylon area ⊕ Retain teams to monitor transmission line 	<ul style="list-style-type: none"> ⊕ Contractor ⊕ Proponent ⊕ Provincial Administration 	Routine patrols and routine checks	Routine patrols	Part of project cost
Loss of vegetation cover during construction	<ul style="list-style-type: none"> ⊕ Avoidance of unnecessary vegetation clearing and reinstating cleared vegetation ⊕ Replanting of trees where possible 	<ul style="list-style-type: none"> ⊕ Contractor ⊕ Proponent 	Planting of more trees	Periodic checks	Part of project cost
Demolition of houses	<ul style="list-style-type: none"> ⊕ Adequate and timely compensation for those to be displaced. ⊕ Advance payment of residential property 	<ul style="list-style-type: none"> ⊕ Contractor ⊕ Proponent 	-	Once off activity	Provided in the project budget
Workers accidents during construction process.	<ul style="list-style-type: none"> ⊕ All workers will be sensitized before construction begins, on how to control accidents related to construction. ⊕ A comprehensive contingency plan will be prepared before construction begins, on accident response. ⊕ Accordingly, adherence to safety procedures will be enforced. ⊕ All workers to wear protective clothing during construction, including helmets. ⊕ Construction work will be limited 	<ul style="list-style-type: none"> ⊕ Project proponent/contractor ⊕ Divisional Public Health Officer ⊕ Ministry of Labour ⊕ Workers ⊕ NEMA inspectors 	Routine Activities	Periodic checks	40 000 per month

	to daytime only				
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Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Means for Monitoring	Frequency for Monitoring	Estimated Cost (Kshs)
Mushrooming of food kiosks	⊕ Eating places will be provided on site, with adequate wholesome water and waste disposal handling services, during construction process.	⊕ Divisional Public Health Officers/Ministry of Health ⊕ NEMA inspectors	Periodic Activities	Periodic and surprise checks	100,000 per annum
Inadequate human waste disposal by workers during construction process	⊕ As provided for by the Building Code, a temporary latrine will be provided on site to be used by construction workers	⊕ Project proponent ⊕ Contractor ⊕ Ministry of Health ⊕ Ministry of Labor ⊕ NEMA inspectors	Periodic Activities	Periodic checks	5 000 at once
Increase in STI infections	⊕ Sensitisation of local communities and staff working on the project on dangers of free lifestyle	⊕ Proponents ⊕ Ministry of Health	Periodic random screening Secondary data from health institutions	yearly	Part of project budget

9.0 RECOMMENDATIONS

9.1 Overview

An evaluation of the impacts resulting from implementation of the proposed project indicates that the negative impacts vary from insignificant, through moderate to significant scale. The EMP developed provides for adequate redress to all these impacts. In view of this therefore, the project does not pose any serious and negative environmental impacts.

The proposed project will inject USD 150 million to the national economy. The project will create employment and improve income earnings in all the areas traversed by the proposed power line.

9.2 Recommendations

Following the impact analysis presented in the previous sections, here below are the recommendations:

- The Proposed project to be implemented in compliance with the relevant legislation and planning requirements.
- The proponent to implement the mitigation guideline provided in the EMP in collaboration with the Contractor.
- That National Environmental Management Authority do consider, approve and grant required Environmental Impact Assessment License to the proponent
- That the scale and scope of the project does not require the preparation of a full Environmental Impact Assessment Study Report.

REFERENCES

1. Agriculture Act (Chapter 318 of the Laws of Kenya)
2. Electric Power Act (Act No. 11 of 1997)
3. Geology of Baringo- Laikipia area . Ministry of Environment and Natural Resources Report 104 1988
4. Geology of Maralal area . Ministry of Environment and Natural Resources Report 105 1987
5. Physical Planning Act (Cap. 286)
6. Environmental Management and Coordination Act No. 8 of 1999.
7. Legal Notice No. 101: The Environmental (Impact Assessment and Audit) Regulations, 2003.)
8. The Energy Act, 2006
9. The Forests Act (Chapter 375 of the Laws of Kenya.)
10. Land (Group Representatives) Act (Chapter 287 of the Laws of Kenya)
11. The Public Health Act (Cap. 242)
12. The Local Government Act (Cap. 265)
13. Occupational Health and Safety Act
14. Sessional Paper No. 6 of 1999 on Environment and Development
15. The Penal Code (Cap. 63)
16. The National Environmental Action Plan (NEAP)
17. The National Shelter Strategy to the Year 2000
18. The National Poverty Eradication Plan (NPEP)
19. The Poverty Reduction Strategy Paper (PRSP)
20. The Rio Declaration on Environment and Development
21. The World Commission on Environment and Development
22. Wildlife (Conservation and Management) Act Chapter 376 of the Laws of Kenya
23. Way leaves Act (Chapter 292 of the Laws of Kenya)

APPENDIX 1- Sample Questionnaire for community members

QUESTIONNAIRE FOR THE PROPOSED 400 KV TRANSMISSION LINE AND SUBSTATION FROM LOYANGALANI TO SUSWA-COMMUNITY MEMBERS

Proposed Project

Kenya Power and Lighting Company (KPLC) is proposing to construct 400km of 400 KV transmission lines to transfer power from Lake Turkana wind Power Project located at Loyangalani to Suswa in Rift Valley Province. The substation is to be located at Suswa.

This questionnaire is administered to collect and collate views of the community members to facilitate in the compilation of Environmental impact assessment report as required by EMCA (1999) and EIA /EA Rules and Regulations (2003).

General Information

1. Enumerator's name Calistus Ndungali
2. Respondent's name Abraham Wakahu
3. Date of interview 16/06/08
4. Location Shenata Division Ndunaga District Myandama North

Demographic data

1. Head of Household's Name: Daniel Mathege
2. Sex: Male: Female:
3. Tribe: Kisumu
4. Occupation: Farmer
5. Religion: Christian
6. Total Household members: 8

Education level

number of members

- | | |
|------------------------|----------|
| a. Primary | <u>3</u> |
| b. Secondary | <u>—</u> |
| c. College/ University | <u>—</u> |

Public Health

State the type of diseases experienced in your household and frequency of occurrence.

Disease	Monthly	Seasonally	Annually
Malaria	-----	<u>✓</u>	-----
Bilharzia	-----	-----	-----
Typhoid	-----	<u>✓</u>	-----

Cholera	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eye infection	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Anemia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin Disease	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AIDS (HIV)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ulcers	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Measles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pneumonia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others/specify	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Where do you go for health assistance?

- Hospital (specify)
- Dispensary (specify) *Kirimo dispensary*
- Clinic (specify)
- Traditional herbs (source)
- Others (specify)

What concerns do you anticipate from the construction 400 KV Transmission Line And Substation from Loyangalani to Suswa on community health?

- Connect electricity to dispensary.

Housing Typology (tick)

- Permanent
- Semi-permanent
- Temporary

What concerns have you noted/anticipated from the proposed 400 KV Transmission Line and Substation from Loyangalani to Suswa on housing typology? -----

and house build permanent.

Agriculture Production

Crop type	Subsistence/sale	Acreage	Production	Unit price
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Maize	Both	2	15 bags	KSh 6000 - 150
Millet	-	-	-	-
Cassava	-	-	-	-
Beans	Subsistence	1/4	16 bags	-
Groundnuts	-	-	-	-
Bananas	-	-	-	-
Vegetable	Both	1	90 bags	KSh 3000
Fruits (specify)	Subsistence	1/8	-	-
Potatoes	Both	1/2	18 bags	KSh 1200
Peas	-	-	-	-
Onions	sale	1/2	3000 Kgs	KSh 25
Wheat	-	-	-	-
Sorghum	-	-	-	-
Others (specify)	-	-	-	-
	-	-	-	-

What concerns do you anticipate from the proposed 400 KV Transmission Line and Substation from Loyangalani to Suswa on agricultural production?

- Anticipate Irrigation
(we have short rain seasons).

Land Tenure System

Under what type of tenure do you use this land?

- Freehold (registered) ✓
- Freehold (unregistered)
- Leasehold
- Tenancy
- Customary/communal
- Do not know

What concerns do you anticipate from the 400 KV Transmission Line and Substation from Loyangalani to Suswa on land tenure system/prices

No concern.

Livestock Production and Composition

Type	Number	Purpose (subsistence/sale)	Income (Kshs/year)
Cows	2	Milk for sale	Ksh 12,000
Bull	1	sale	"
Sheep	5	sale	Ksh 15,000
Goats	—	—	—
Donkeys	—	—	—
Pigs	—	—	—
Camels	—	—	—
Rabbits	—	—	—
Poultry (Chicken)	12	both	Ksh 3,000
Others dove	8	subsistence	—

What impacts do you anticipate from the proposed 400 KV Transmission Line and Substation from Loyangalani to Suswa on local livestock?

Anticipate zero impact.

Date: 16.06.08 Signature: [Signature]

APPENDIX 2 - Sample Questionnaire for Community Leaders

Proposed Project

Kenya Power and Lighting Company (KPLC) is proposing to construct 400km of 400 KV transmission lines to transfer power from Lake Turkana wind Power Project located at Loyangalani to Suswa in Rift Valley Province. The substation is to be located at Suswa.

This questionnaire is administered to collect and collate views of the community leaders to facilitate in the compilation of Environmental impact assessment report as required by EMCA (1999) and EIA /EA Rules and Regulations (2003).

A. GUIDELINES FOR LOCAL COMMUNITY LEADERS

Site/location: LOSUK

Enumerator: David & Linda

Name of the interviewee: DAVID LESIMIKSANA Address: 230 MARALAL

Do you have any information on the proposed power transmission project? (Yes/No) No

If Yes. Name the source _____

What community/ communities inhabit the land on which the proposed power transmission line is to be constructed?

SAMBURU

ELMOLO

TURKANA

POKOT

BESIAT

RENDILE

Give a brief history of the community in the area

They are Nomadic Pastoralists where land is owned communally. Rule gerontologically by Councils of Elders. Practice arable agriculture. The area is semi-arid. The area is sparsely populated, with poor infrastructure

Under which of the following group is the community organized?

Clans

Family

Sub groups

Others specify

The society as a whole is structured along six main levels. In order, the smallest group to the largest they are lineage, ham-sharing, sub clan, Phratry and Moiety.

List the main economic activities in the area? -----

Agriculture
Pastoralism
Bee Keeping
Trade and Commerce
Traditional Industries

Under what type of tenure do you use this land?

- Freehold (registered)
- Freehold (unregistered)
- Leasehold
- Tenancy
- Customary/communal
- Do not know

What are the main concerns in the implementation of the proposed power transmission project for the surrounding community?

- i) create Employment opportunities
- ii) opening up the interior
- iii) Proper Land Utilization
- iv) Tourism
- v) Education
- vi) cost and awareness, capacity building on the project

Are there areas of special interest likely to be affected by the proposed power transmission line? (Yes/No)

If Yes specify

- Yes
- i) Political
 - ii) Private land
 - iii) Communities Relations and Co-existence
 - iv) Special interests

Do you perceive any conflict areas (issues) with the existing situation Yes Yes No ----- if yes, then state which and explain? Private land

Owners of Private land can influence the mapping and labour.

According to you, what are the main challenges experienced by the community, please list -----

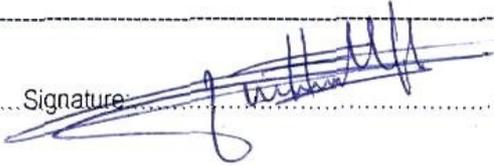
- i) Poor Education

- ii) Poor Infrastructure
- iii) Basic Health Care
- iv) Poor Sanitation
- v) Local Participation?

What challenges is the proposed power transmission project likely to encounter, please list

- i) Hard terrain (topography)
- ii) Remoteness of the area
- iii) Poor accessibility
- iv) Hostile climate
- v)

Date: 11/06/2008

Signature: 

APPENDIX 3 - Sample Questionnaire for Institutions

Proposed Project

Kenya Power and Lighting Company (KPLC) is proposing to construct 400km of 400 KV transmission lines to transfer power from Lake Turkana wind Power Project located at Loyangalani to Suswa in Rift Valley Province. The substation is to be located at Suswa.

This questionnaire is administered to collect and collate views of the key stakeholders to facilitate in the compilation of Environmental Impact Assessment report as required by EMCA (1999) and EIA /EA Rules and Regulations (2003).

Target Group

- Kenya Wildlife Service ✓
- Kenya Forest Service
- Group ranches

General Information

- Enumerator's name ----- JAMES KARIUKI WATHURI -----
- Respondent's name ----- DANIEL KONCIPELLAH -----
- Designation: ----- PERSONAL ASSISTANT TO ASSISTANT DIR. Mt -----
- Date of interview ----- 17/06/08 -----
- Location-----Division ----- MURANGA -----District----- MURU MATHI -----

ABERDEEN
LORAMBA

Do you have any information on the proposed power transmission project? (Yes/No)

If yes. Name the source-----

What are the issues s you may have on the implementation of the proposed power transmission project on the following

1. Land ----- - permission to use land by land users -----
----- - compensation of land by the constructing agency -----
2. Forest cover ----- - Destruction cover/reduction in forest cover -----
3. Wildlife ----- → Tower to be strong enough -----
----- → No conflict -----

4. Environment..... - Minimal interference
5. Water Resources..... - No interference
6. Habitats..... - No specific habitats will be affected
Old Boloait has been avoided in the route
7. Dispersal areas..... - Whore of Levilapi & Samburu are dispersal
8. Others specify.....

Are there animals are likely to be affected by the proposed power transmission? (Yes/No)

If yes. Specify - Given the height of the towers, no specific animals are going to be affected. There are similar lines through Isard East & West park and there is no incidences of

List the wildlife species occurring in the area surrounding the proposed power transmission line and substations.

Elephants, gazelles, zebras, leopards, various species of antelopes, ostriches.

Any suggestion on the project

> During construction

> Operation Phase

Date:

19/6/08

Signature:

[Handwritten Signature]

APPENDIX 4- Sample Questionnaire for Institutions

Proposed Project

Kenya Power and Lighting Company (KPLC) is proposing to construct 400km of 400 KV transmission lines to transfer power from Lake Turkana wind Power Project located at Loyangalani to Suswa in Rift Valley Province. The substation is to be located at Suswa.

This questionnaire is administered to collect and collate views of the key stakeholders to facilitate in the compilation of Environmental Impact Assessment report as required by EMCA (1999) and EIA /EA Rules and Regulations (2003).

Target Group

- Kenya Wildlife Service
- Kenya Forest Service ✓
- Group ranches

General Information

- Enumerator's name JAMES KAMUKI / CALISTUS NOUNGILU
- Respondent's name J.M. GASHONDA
- Designation: FOREST ASSISTANT
- Date of interview 19/06/08
- Location-----Division NBARAGWA District NYANDARU A NORTH

Do you have any information on the proposed power transmission project? (Yes/No)

If yes. Name the source-----

What are the issues s you may have on the implementation of the proposed power transmission project on the following

1. Land..... NO Green
2. Forest cover..... Reduction of forest cover when the corridor will be cleared. Indigenous shrubs to be planted on the corridor Namid ensin.
3. Wildlife..... Important wildlife habitat will be disrupted = gazelle, antelope, rabbit, etc.

4. Environment..... Visual intrusion,
5. Water Resources..... Removal of vegetation will negatively influence water sources.
6. Habitats..... General disruption of wildlife habitat.
7. Dispersal areas..... None in the area
8. Others specify.....

Are there animals are likely to be affected by the proposed power transmission? (Yes/No)

If yes. Specify

Crazelles, Antclupes, Hares

List the wildlife species occurring in the area surrounding the proposed power transmission line and substations.

Crazelles, Antclupes, Hares,

Any suggestion on the project

> During construction

> Operation Phase

Date:

19/06/08

Signature:

[Signature]

Minimal interference with the forest, planting
herbaceous vegetation
to be camouflaged with colour green - trees/pines

APPENDIX 5– Lists of participant for public Consultations
APPENDIX 5-1- Program of public consultation

PROGRAM FOR PUBLIC CONSULTATIONS MEETING FOR THE PROPOSED
400 KV TRANSMISSION LINE AND SUBSTATION FROM LOYANGALANI TO
SUSWA

1. Introduction
2. Remarks by the Coordinator
3. Remarks by the Community leaders- chiefs, assistant chiefs, elders etc
4. Address by the Environmental Consultant on:
 - * The specific purpose of the meeting.
 - * Nature, purpose and scope of the project
 - * NEMA Requirements
 - * Invites comments from the public
5. Comments from the community
6. Closing Remarks

APPENDIX 5-2- Public Consultation participants- Longonot chief's camp meeting

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	Paul Kimani Kurqu	0874245		
2	Samuel Kibe	10272730		
3	Peter Mwachaga Gachico	8516162		
4	Stephen Kiguru Kiarie	3500732		
5	George Kiarie Kuria	5251827		
6	George Mathai Ndentu	6837649		
7	Daniel Kinuthu Kibungu	9371949		
8	John Kagai	6432649		0720566088
9	George Kagwima	9836737		0725741289
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

District: NAIVASHA Division: MA MATHU Location: LONGONOT
 Sub location: LONGONOT Village: Longonot
 The meeting ended, 11:00 AM
 Secretary
 Community Representative Chief Kagwima
 Environmental Consultant Representative
 Date 14/06/08

APPENDIX 5-3- Public Consultation participants- Kabati shopping Centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	JOSEPH KAMAU KIMATI	0804408		Box 1
2	AMOS MURITHI	2963114		
3	DAVID NDIRANGU KAMAU	20819025		
4	JOHN B. MUIRA KAMAU	1879624		
5	SIMON MDIRANGU	11804758		
6	PETER MUGU CHERE	7657801		
7	DANIEL NJORGE	5771691		
8	JEMIMAH WANGARI	2940710	Wangari	
9	ISAACK NJORGE	5787147		
10	SAMSON WANDERI	11804715		
11	DANIEL MURUGA	10881006		
12	DAVID MAINA	10642081		
13	JOSEPH MUGO	3601866		
14	JOSEPH GATHUMA	9199688		
15	OMESMUS MUIRARI			
16	PETER MACHARIA	2960251		
17	STEPHEN M. MUTIGA	2322030		
18	CHARLES KATTORI	22062533		
19	PETER M. MWANGI	3702329		

District: NYANDARUA SWT Division: KIPIRI Location: Lereshwa

Sub location: Lereshwa Village: KABATI

The meeting ended, 4:00 P m

Secretary

Community Representative

Environmental Consultant Representative

Date 14/06/08

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	FRANCIS MURIMA	3317800		79, MUKI
2	ISAAC MWAURA	2941332		
3	Stanley Ndumbi	26577575		
4	Muga Murima			
5	PETER WAMBUGU	2523032		
6	PETER KAMUJE			
7	TABITHA WARGUA			
8	DAVID NDUNGU	0345190		
9				
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19				

District: NYAKARA SOUTH Division: KIIRI Location: LEKEITHWA
 Sub location: LEKEITHWA Village: KABATI
 The meeting ended, 4:00 p.m
 Secretary
 Community Representative
 Environmental Consultant Representative
 Date 14/06/08

APPENDIX 5-4- Public Consultation participants- Lereshwa Shopping Centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	JOSEPH K. MURICHU	0020090		2607 GILGIL
2	PETER KARUGUA	1420283		104 GILGIL
3	JOHN MDEGWA	2345309		104 GILGIL
4	JOHN WAINALUA	1125020		
5	JOSEPH T. MURICHU	2341950		104 GILGIL
6	GEORGE M. MUCHIRU	10976689		104 GILGIL
7	WILSON T. WANJEMAI	22808831		104 GILGIL
8	MARGARET KAMAU	- N/A		262 MIHARATI
9	JOSEPH MBURU	- N/A		149 GILGIL
10	JOHN MATWA			
11	DOUGLAS WANDERI	22218029		262 MIHARATI
12	JAMES NJOROSI	7181933		104 GILGIL
13	JOSEPH NDIRUNGI	11826995		104 GILGIL
14	BENJAMIN K. KINYANTUI	23957382		104 GILGIL
15				
16				
17				
18				
19				

District: NYANDARUA SOUTH Division: KIPIRI Location: LERESHWA

Sub location: LERESHWA Village: LERESHWA

The meeting ended, 5:40 P.m

Secretary

Community Representative

Environmental Consultant Representative

Date 14/06/08

APPENDIX 5-5- Public Consultation Participants- Suswa

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	MBITIARI OLE KISHAU	8814730		IN/ENKARE. - CHIEF
2	SIMEU KASHU OLOTHOKI	9884484		IN/ENKARE. - SECRETARY TO THE CHIEF
3	JOEL OLE ROPES	9785671		IN/ENKARE.
4	LONGISA OLE NALOI	0101133		IN/ENKARE.
5				
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19				

District: NAROK NORTH Division: MAO Location: ENDUPUYA

Sub location: ENDUPUYA Village: SUSWA

The meeting ended, 3:42 P.M

Secretary

Community Representative

Environmental Consultant Representative

Date 11/06/08

APPENDIX 5-6- Public Consultation participants- Matigari (Rumuruti)

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	Harun Maana		[Signature]	169 Rumuruti
2	Francis Macharia		[Signature]	—
3	Harrison Bichuki		169 [Signature]	169
4	Isaiha Mwangi		169 [Signature]	Mulindi
5	Bonyake Muriuki		[Signature]	169 [Signature]
6	Paul Wanyeki		[Signature]	—
7	Peter Muriuki		[Signature]	—
8	SAMUEL GITHAI GA		[Signature]	—
9	Joseph Nguru		[Signature]	—
10	Samuel Kimani		[Signature]	—
11	Joseph Kabiru		[Signature]	—
12	Joseph Kinyua		[Signature]	160 Rumuruti
13	Daniel Muriuki			—
14	Joseph Mudiia		[Signature]	—
15	Benad Gutori		[Signature]	—
16	Peter Kinyua		[Signature]	—
17				
18				
19				

District: Lailapia West Division: Rumuri Location: Mutara

Sub location: Mutara Village: Matigari

The meeting ended, 11:31 A.M

Secretary [Signature]

Community Representative [Signature]

Environmental Consultant Representative [Signature]

Date 21/06/08

APPENDIX 5-7- Public Consultation Participants- Kinaba

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	JACOB MUSEWA-M.	11242313		2027
2	PETER MWAI BATHUKU	8846482		83
3	J. MURICHU WAMUKU	0770338		83
4	STEPHEN MONIU	10772635		83
5	Zakaria Kihii			1176 NUS.
6	Beth Nyambura Mungai	0840619		706 NSA
7	Moses Mwachira Njoroge	0476532		1755
8.	Edugu Gilhegi			
9	IMBogo			
10	Charles Kalungu	3337981		
11	JOSEPH MUKUNDU	0372320		
12	JOSEPH MUKI			
13	SAMUEL NGURE	22170248		1285
14	PETER Mavati	9556013		
15	JOHIL THUD			199
16	ROSE MUKUITI			83
17	MARGARET WANJIRA	5783990		83
18	JANE WANGUI			83
19	HANNAH NJENGA			

District: NATIVITA Division: NATIVITA Location: NATIVITA EAST
 Sub location: MARAGISHU Village: KIWAMBA
 The meeting ended, 1.00 P.M.
 Secretary:
 Community Representative: CHIEF
 Environmental Consultant Representative: WANGASHA EAST LOCATION
 Date: 29/06/05

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	MARY WAIRIMU	3642720		83 NVS
2	RACHAEL NYAMBURA	3644522		
3	FRANCIS MJOROKI KURIA	2321960		
4	GISHENJI THOO	7096633		
5	MWANISI NDERI	0476556		
6	MAIWA CHEGE	0780318	63	249 NVS
7	MILLIAM NJOKI	1129074		821 NVS
8	WAIHERA NGOGOYO			
9	ELIUD K CHEGE	11046991		
10	WILSON MURAH MURAH	9741832		2027
11	JACKSON WANYERI	0874747		83
12	ELIAS NJORGE KUMBU	0376279		
13	PAUL WANGANDA MURAGI	1023785		
14	ESTHER WANJIKU KANGA	1338011		343 NVS
15	MATU WANGENI KAMUKI	1053467		.
16	MURIS MURAGA	1069340		110 NVS
17				
18				
19				

District: NAWASHA Division: NAWASHA Location: Nawasha East
 Sub location: MARAIGUSHE Village: KURAMBA
 The meeting ended, 1:00 Pm
 Secretary: [Signature]
 Community Representative: [Signature] CHIEF NAWASHA EAST LOCATION
 Environmental Consultant Representative: [Signature] David & Linda
 Date: 20/08/08

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	GEOFFREY WIKINYANTWI	22573079	<i>[Signature]</i>	249 NRS.
2	DANCAN GITHIARA			
3	DORCAS MUTHONI G.	11290721	<i>[Signature]</i>	249 NRS.
4	ESTHER NJOKI M.		<i>[Signature]</i>	249 NRS.
5	MILKA NJOKI M	13450215	<i>[Signature]</i>	249 NRS.
6	BEATRICE WANGARI		B.E	249 NRS
7	PAULINE WANGUI	21627068	<i>[Signature]</i>	249 NRS
8.	Ruth Wangui	3643934	Ruth	259 NRS
9	DAVID MUIRURI G.	6148989	D. MUIRURI	249 NRS
10	STEPHEN KAIRU KIHURIA	0476840	<i>[Signature]</i>	1455 NRS
11	LEAH NUNU	4305102	<i>[Signature]</i>	249 NRS
12	Paul Thiongo Mbiti	11292068	JORAN	249
13	KIBOI KARUKI	11242416	KIBOI	249
14	PETER NGIGI	11082583	<i>[Signature]</i>	
15	HANNAH NJERI			249 NRS
16	Margaret Muthoni			
17	Lucy Muthoni			
18	Margaret Wangari			
19	Pearl Kenge	0840840	<i>[Signature]</i>	343 NRS

District: NAIVASHA Division: NAIVASHA Location: NAIVASHA EAST

Sub location: MARAGISHU Village: KINAMBA

The meeting ended, 100 P.M

Secretary *[Signature]*

Community Representative *[Signature]* CHIEF NAIVASHA EAST LOCATION

Environmental Consultant Representative *[Signature]*

Date 20/06/08

APPENDIX 5-8- Public Consultation Participants- Longewan Market centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	TAPAZU LEMARUMBE	3047088		60 Maralal
2	KODANYA LEKIREU	5163182		60 Maralal
3	SIPTAI LESERPENA	4191662		60 Maralal
4	LIBARE LENAIMUTI	16070660		60 Maralal
5	JOSEPH TOWETT	20763406		60 Maralal
6	TONGEI LEMARIA	0859600		60 Maralal
7	NATEMI KASINO	6148905		60 Maralal
8	MOSES OLE MEIDIMI	2017524		60 Maralal
9	SOSPETER LEKESIER	11418667		60 Maralal
10	JULAI LEPOSE	4191743		60 Maralal
11	LENKINYEU LEIRANA	4191875		60 Maralal
12	JACKSON LETEROI	10939960		60 Maralal
13	ESTHER LANGAI	6294662		20 Suguta
14	NAISIMARI LELEMURI	0958202		20 Suguta
15	NALOVESHA LEMOII	9532980		20 Suguta
16	HONGI LEKARKAR	4191648		20 Suguta
17	PARSALOI LEKIPAIIKA	4191699		20 Suguta
18	YUSUF OLESORORO	4191816		20 Suguta
19	JOSEPH LESUNATI	9052089		20 Suguta

District: Samburu Division: Loroki Location: Amaya

Sub location: Longewan Village: Longewan

The meeting ended, 2:30 pm

Secretary:

Community Representative: PARSALOI LEKIPAIIKA

Environmental Consultant Representative: David Mungai

Date: 13/6/08

APPENDIX 5-9- Public Consultation participants- Loosuk Market centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	ALFRED LEMANYU	22393558		"
2	GIDEON LESIMIRANA	8733566		143 MABALAC
3	THOMAS LOOSENGE	7965493		143 1)
4	NOAH LESIMIRANA	2277595		142 1)
5	TIMOTHY LALLERAN	08585891		"
6	LESERAGE LODEMEN	3440891		"
7	LEMATURA LESIMAS	0859609		"
8	LEMBURTANG LEMAMPARAN	0293208		"
9	JOHN LALLERAN	9533133		"
10	LOLKIRIK ALFRED	9844504		"
11	LETUKE L FRANCIS	22537542		"
12	CHRISTOPHER LESIMIRANA	22503777		"
13	LEKOPIEN IAJARI	22417621		"
14	DAVID LESIMIRANA	0859761		143
15	LINDA LEMOKUYAA	23123596		"
16	FRANCIS LEMANYU	41910302		"
17	SOSUNI LOUSENGE	22313575		"
18	EDWARD LOOSENGE	07128981		"
19	KUNTAL LEKUTUKAI	20089132		"

District: SAMBURU Division: KIRISIA Location: LOOSUK

Sub location: LOOSUK Village: LOOSUK

The meeting ended, 3:00 P.M.

Secretary THOMAS LOOSENGE

Community Representative TIRAS LEKOPIEN

Environmental Consultant Representative DAVID & LINDA

Date 14/6/08

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	Paninah LekoPiem	20232009		143 MRL
2	ENDWARD Loosenge			124 MRL
3	Safiri Lekerem			111 MRL
4	MARTIN LESIMIRDANA	12833954		143 MRL
5	Solobia Lekerem			111 MRL
6	John Loosenge	3046632		143 MRL
7	SIMON LERKOPIN			143 MRL
8	Weiso Lengulisia			78 MRL
9	Musa Leadisimo	2219243		143 MRL
10	Heron Leleruk			143 MRL
11	Pamul Lesenge			143 MRL
12	Lesimang Lelekong			143 MRL
13	Gideon Lesseng	22980404		143 MRL
14	Saruni Loosenge	2231354		
15				
16				
17				
18				
19				

District: Samburu Division: KIRISIA Location: LOOSUK

Sub location: LOOSUK Village: Loofull

The meeting ended, 2.00 p.m.

Secretary THOMAS Loosenge

Community Representative TIRAS LekoPiem

Environmental Consultant Representative DAVID & LINDA

Date 14/6/08

APPENDIX 5-10- Public Consultation participants- Poro Market centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	ROBERT LENKIDI	304183		334
2	BADICHO LENGEES	3421331		334
3	LKOYOR LENKIDT	0860024		334
4	KARAMULE LESOGOTA	12451785		334
5	DANIEL LETITOYA			334
6	FRANCIS LETIOMA	9843167		79
7	PRARMA LOMUNTE			
8	PMAINSO LENKUBE			
9	JAMES LEWASO			
10	NAITORE LENOKUKUL			
11	LIATREU LELSIIT			
12	RICHARD LELSIIT	22581961		249
13	FRANCIS LEWANYEKIE			
14	HASSAN ALI	13044700		50
15	T. LENCHALOTE	0291777		50
16	LEANGIS LELSHED	3016883		
17	CHARLES ROTICH			50
18	NYABULAN LENOKULAL			
19	JOHN LETONON S.			50

District: SAMBURU CENTRAL Division: KIRISIA Location: PORO

Sub location: AKLASO Village: LESUNTA

The meeting ended, 1:00 PM

Secretary FRANCIS LELSIIT 9843167

Community Representative DAVID LENGEES

Environmental Consultant Representative DAVID MUNGAI & LINDA MAINA

Date 14/06/08

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	SOTEN LENKISI	0860036	[Signature]	50 79
2	RUKYAN LEMOWAN	3344036	[Signature]	50 79
3	FRANCIS L. LEMULAL	3018959	[Signature]	50 79
4	JOHN L LESILANDY	0733205	[Signature]	50 79
5	George Lemooje	0293570	[Signature]	217 MRL
6	JACKSON P. LESUNYUS	13064604	[Signature]	79
7	MUNGANE LEMOYAN	9842936	[Signature]	2 MRL
8	Francisca Naomi	20860021	[Signature]	350 MRL
9	Margrat Lenarokwe		[Signature]	79 MRL
10	RABBI LEPIIR		[Signature]	
11	EVANSONI LELESIT		[Signature]	112 MRL
12	RAITA LELESIT			79 MRL
13				
14				
15				
16				
17				
18				
19				

District: Sambud Central Division: KIRISIA Location: PORO

Sub location: MAKOSU Village: LESUNTAI

The meeting ended, 1:00 PM

Secretary FRANCIS LELESIT 9843167 [Signature]

Community Representative DAVID LEMOYAN [Signature]

Environmental Consultant Representative DAVID MUNGANE & LINDA MAINA

Date 14/06/08

APPENDIX 5-11- Public Consultation participants- Morijo Market centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	RETUK LAKESIKE	22691024		462, MRL
2	Joseph Kshukanya	2244662		11
3	JOHN KESIRITE	114516		
4	Lesawa Ambode	22518518		11
5	Moses Letohma	2177122		
6	SIMON Lemang	3011479		29 Banyan
7	Joseph Tekupe	13044790		
8	Nick Xpakos	9843093		
9	Danson Lesuyai	23501754		
10	John Leipele			
11	Lentumunai Tongobai			
12	Inde Lesarge			
13	Lakesike Lekooyio			
14	Saibulu Lakesike			
15	Sunday Leshimpuro			
16	Joseph Tesooka	23495934		11
17	Kosechu Lewao			
18	Lekamaro			
19	Lokitekui			

District: SAMBURU Division: KIRISIA Location: ANGATA-NANYOKIE

Sub location: MORJO Village: MORJO

The meeting ended, 1520HRS

Secretary JOSEPH RETUK LAKESIKE

Community Representative TONGORAI LENTUMUNAI

Environmental Consultant Representative David & Linda

Date 15/06/2008

APPENDIX 5-12- Public Consultation Participants- Marti Market centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	NICHOLUS J LEPAKIYO		<i>Nhus</i>	
2	SAMUEL LEKIRIYEI			
3	ILIPA LEWARANI			
4	LOIDINGAE LEWARANI			
5	HASSAN LEWARANI	13045920	<i>Hassan</i>	189 AKKABE
6	JOSEPH LEWARANI	3018615	<i>Joseph</i>	
7	IPARINI LOKKIRIK LEWARANI		<i>IPARINI</i>	
8	NIESIA LEWARANI			
9	LOREEN LEPEEYA			
10	LETIPTIP LESABILE			
11	NAKURO LEKARANKWA			
12	RAMPAN LEPEEYA			
13	SALIMO LENAIGERO		<i>Salimo</i>	
14	LOBUIN NAKWAPUS		<i>LOBUIN</i>	
15	MARATHION LENYOKOPIRO		<i>MARATHION</i>	
16	LETININA E CORNEZIUS	25113094	<i>LETININA</i>	
17	NALICE LIKO		<i>NALICE</i>	
18				
19				

District: SAMBURU NORTH Division: BARAGOI Location: Sgt Suiyan

Sub location: Marti Suiyan Village: Sulubei

The meeting ended, 3:30 pm

Secretary NICHOLUS J LEPAKIYO ADUS

Community Representative IPARINI LOKKIRIK

Environmental Consultant Representative David & Linda

Date 21-6-2008

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	WILLIAM NAPEEI			
2	ALEPER EKEVO			
3	WILLIAM NGASIKE			
4	KICHAKAE E SIKALE	24180225		
5	ERUDE L. JACKSON	22479347		
6	LOPAYA LONUKO			
7	BARNABA MAJUNDA	23277912		
8	YUDA MAJUNDA			
9	NGIDONY NACHATA	4198783		
10	LOWASA LORU			
11	KADOKOR KAPUA	4196989		
12	ECHOTO NASANA			
13	GEORGE KWATION	9532782		22 MARTI
14	LOKURE LORU			
15	SAMWEL NGASIKE			
16	KIWO NADEI			
17	EKABELI KWANGINTIA			
18	JOHN EKIRU	0211550		
19	LOKARACH LORERE			

District: SAMBURU NORTH Division: BARAGOI Location: Marti

Sub location: Kalele Village: Kalele

The meeting ended, 5:30 PM

Secretary EKITELA N'LOPATEU

Community Representative NGIDONY NACHATA

Environmental Consultant Representative David & Linda

Date 21/6/08

APPENDIX 5-13- Public Consultation Participants- Baragoi Ngilai Village

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	JEREMIAH LELEKONG	4199499		
2	MAMPION LENGERIAI			
3	RICHARD LENAITUWAKI			
4	NALEENYI LOPIRDAT			
5	LAINGUDAI LEPARIE			
6	PETRO LEAJORE			
7	MEITANDI LENKALTAAM			
8	LMAMPISAN LEPARLERU			
9	LÉPARIE LECHOE			
10	KONGONI LEPAKIYO			
11	LTUMUSEN LOLTANGWAS			
12	WENDOROPE LATAPAR			
13	RIPILÉN LENTIMALBI			
14	LEREMIN WELESHEP			
15	LEERIE LEKALAU			
16	SUMUNI LEWUASO			
17	SAALE LESUYAI			
18	NGIATET KEHDE			
19	FRANCS LENAMUGIE			

District: SAMBURU NORTH Division: BARAGOI Location: EL-BARJA

Sub location: NGILAI Village: NGILAI

The meeting ended, 15:50

Secretary [Signature]

Community Representative Levewan Letuanga

Environmental Consultant Representative Linda & David

Date 16/06/08

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	LITAS LEATURU			
2	NTIMAYO LESHOE			
3	ESTHER LEMWATAT			
4	RUTH LEITORO		RUTH	
5	TERESIA LOLMINGANI		Teresia	
6	RANIMON LENTIMO			
7	STELLA LALAANTARE			
8	SIRIANTO LETAPAR			
9	NONKEWAN LEARAMO			
10	JANE LESHOE			
11	GUYON LEMWATAT			
12	NANYAMAR LEPARLERU			
13	MATEU LARAANTARE			
14	KALTIPE LEITORO			
15	NAISABA LENHEKUT			
16	MARY LETAPAR			
17	RIANALAI LELEINA			
18	MIRIAM LOMODOONI			
19	MEJARAIN LELEINA			

District: SAMBURU NORTH Division: BARAGOI Location: ELBATA

Sub location: ONGILAI Village: NGILAI

The meeting ended, 15:50

Secretary: [Signature]

Community Representative: Jeremiah Lelekong

Environmental Consultant Representative: Linda & David

Date: 16/06/08

APPENDIX 5-14- Public Consultation participants- South Horr Market centre

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	James S. Lekatap	13045543		Loonjorin
2	Kutuka Lencsalom	14118		
3	Plasis Lesingiran		1	
4	Barare Lencsalom			
5	Parmati Lepasanyic			
6	Lentiringoi			
7	Lpurji Lekardero			
8	Lesamriei Lesingiran			
9	Pulan Leokoe			
10	Lwakwe Leokoe			
11	Lantane Leokoe			
12	Lkasimpei Leparie	8205851		
13	Lekopisa Leparie			
14	Pureisa Lekupe			
15	Purenges Lepatoyie	30116536		
16	Richard Lesamaja	11455101		
17	Andrew Lengullei	8733728		
18	Lekirale Leparlayia			
19	Lukas masai Lekaewa	42022174		

District: Samburu Division: nyiro Location: South Horr

Sub location: Loonjorin Village: Loonjorin

The meeting ended, 12.50

Secretary: James S. Lekatap

Community Representative: Richard Lesamaja

Environmental Consultant Representative: David & Linda

Date: 17/6/2008

APPENDIX 5-15- Public Consultation participants- Mt. Kulal Gatab

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	P. UKAETUSU K. LONORER	0061927		29 MARGHET
2	KENTORON MURTE	-		21025 NBL1
3	LEMADADA NBLORNA	-		21028 NBL1
4	TIMOTHY LENAWVAMVA	ASST CHIEF 0061338		11
5	ALI L. KASAPICHO	22591810		11
6	Lemadoda Alex	2287369		21028 NBL1
7	Rev. JOB F. LEARANO	0026869		21028 NBL1
8	SIMON L. LEARANO	0061392		11
9	DAMARIS KEPARSANTY	22817638		11
10	NOOR LESAPISHO	12757010		11
11	THOMAS LENGUYAP	21438815		11
12	SAMUEL LEARANO	12757031		11
13				
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District: LAISANIS Division: KOYANGGATI Location: MT. KULAL
 Sub location: GATAB Village: GATAB
 The meeting ended, 10:26 am
 Secretary Shadrack Lenguyap
 Community Representative James Lenarkoi
 Environmental Consultant Representative David & Linda
 Date 18/6/08

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	LENAIKOI JAMES	0061318		
2	JUMA LELERAI	23415270		
3	Julus Loweti	8205506		
4	KUMUSON.B. LEMURSI	23414833		
5	SAMSON D. LELUKUMANI			
6	JOHN LORUKOI LOPEJARAN	0061250		
7	MARDADILO lolokivi	12797057		
8	KAPUWA lemadada	0062787		
9	Lekankwan lengeene			
10	Lemosor Arule			
11	Lpirisi lezanyam			
12	Joan leparsanti			
13	Julus Lengarite	8205821		
14	Harasin Lemuni			
15	Gabriel Wamuro			
16	Elijah gaidole	23418553		
17	Beikan lentawa	0062394		
18	Daniel lengarite			
19	Sony leparsanti			

District: LASAMIS Division: LOVAMBAUN Location: MT. KUALA
 Sub location: GATAB Village: GATAB
 The meeting ended, at 10:20 a.m
 Secretary Shazek Lengayap
 Community Representative James Lenaikoi
 Environmental Consultant Representative Dana & Linda
 Date 13/6/08

APPENDIX 5-16- Public Consultation Participants- Warukira Village

We the undersigned confirm participating in the said meeting and that the comments recorded and read out by the Environmental Consultant are a reflection of the opinion of this community in relation to the impacts of proposed power transmission line and substation.

LIST OF MEMBERS PRESENT

Number	Name	ID/No	Signature	Address
1	Joseph Wambugu Njunge	0236473		19 Warukira Katshe
2	Kihena Gutira	0329650		11
3	Johana Mwirahi	5750221		19 KATHETA
4	Paul Wambau Makeni	0841146		178 KATHETA
5	Benzen Kamatho	5786063		74 KATHETA
6	Daniel W. Muraya	11666991		19 KATHETA
7	Francis Kimmbi Kamun	9504554		19 KATHETA
8	James Karanya	2903031		19 KATHETA
9				
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18				
19				

District: NYANDARUA NORTH Division: NDARUGWA Location: SHAMATA
 Sub location: SHAMATA Village: WARUKIRA
 The meeting ended, 10:00 AM
 Secretary [Signature]
 Community Representative _____
 Environmental Consultant Representative [Signature]
 Date 17/06/08

APPENDIX 6- Photographic Documentation of key features along the proposed Line



Plate 8: Proposed transmission line terminal point at Suswa joining the Existing Double Circuit HV line from Olkaria



Plate 9: Proposed Transmission line alignment in Ndaragwa area



Plate 10: Proposed transmission line alignment at Pesi Swamp



Plate 12: Proposed Transmission line crossing point of Rukuruti- Maralal road

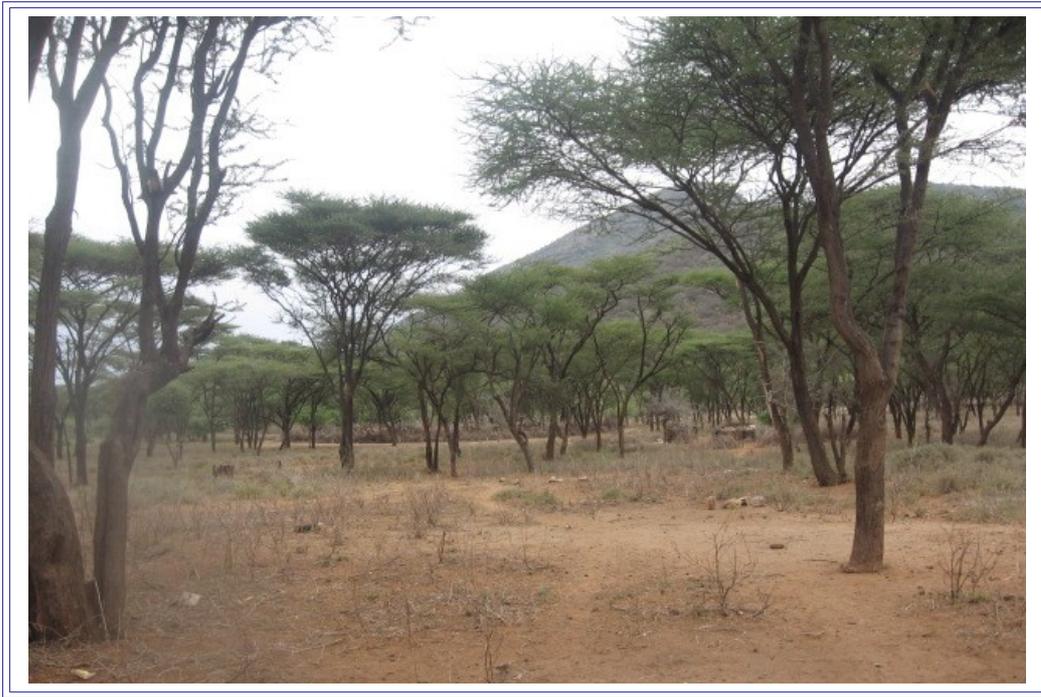


Plate 11: Proposed transmission line alignment near Mt.Ngiro South Horr



Plate 13: Proposed site for the wind Farm and transmission substation at Loyangalani

APPENDIX 7- Water quality results

7-1 Water Quality result for Malewa River



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KENYA

CHEMICAL ANALYSIS ON WATER SAMPLES

SAMPLE SOURCE & DESCRIPTION: MALEWA RIVER WATER

SAMPLED BY: CLIENT

PARAMETER	RESULT	REMARK
P ^H	8.1	
APPARENT COLOUR °H	50	
TRUE COLOUR °H	40	
CONDUCTIVITY μS/CM, mg/l	70	
TURBIDITY, F.T.U	8.5	
CALCIUM HARDNESS AS CaCO ₃ , mg/l	8	
TOTAL HARDNESS AS CaCO ₃ , mg/l	18	
TOTAL ALKALINITY AS CaCO ₃ mg/l	23	
CARBONATE ALKALINITY, mg/l	0	
IRON, mg/l	0.2	
FLOURIDES, mg/l	0.28	
SULPHATES, mg/l	39	
PHOSPHATES, mg/l	0.04	
SILICA, mg/l	75	
DISSOLVED OXYGEN, p.p.m	5.5	
NITRATES, mg/l	2.9	
MANGANESE, mg/l	0	
CHLORIDES, mg/l	17	
CHROMIUM, mg/l	0	
COPPER, mg/l	0	
TOTAL COLIFORM/100ml	-	
TOTAL FAECAL COLIFORM/100ml	-	
DISSOLVED SOLIDS, mg/l	30	
SUSPENDED SOLIDS, mg/l	10	
TOTAL SOLIDS, mg/l	40	
BIOCHEMICAL OXYGEN DEMAND, mg/l	-	
CHEMICAL OXYXYGEN DEMAND, mg/l	-	

GENERAL REMARKS:

SIGNED ----- DATE: -----

7-2 Water Quality results for Pesi River



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CHEMICAL ANALYSIS ON WATER SAMPLES

SAMPLE SOURCE & DESCRIPTION: PESI RIVER WATER

SAMPLED BY: CLIENT

PARAMETER	RESULT	REMARK
P ^H	8.1	
APPARENT COLOUR °H	80	
TRUE COLOUR °H	60	
CONDUCTIVITY μS/CM, mg/l	90	
TURBIDITY, F.T.U	60	
CALCIUM HARDNESS AS CaCO ₃ , mg/l	19	
TOTAL HARDNESS AS CaCO ₃ , mg/l	42	
TOTAL ALKALINITY AS CaCO ₃ , mg/l	27	
CARBONATE ALKALINITY, mg/l	0	
IRON, mg/l	0.4	
FLOURIDES, mg/l	0	
SULPHATES, mg/l	80	
PHOSPHATES, mg/l	0.04	
SILICA, mg/l	80	
DISSOLVED OXYGEN, p.p.m	5.4	
NITRATES, mg/l	3.7	
MANGANESE, mg/l	0	
CHLORIDES, mg/l	19	
CHROMIUM, mg/l	0.02	
COPPER, mg/l	0	
TOTAL COLIFORM/100ml	-	
TOTAL FAECAL COLIFORM/100ml	-	
DISSOLVED SOLIDS, mg/l	40	
SUSPENDE SOLIDS, mg/l	15	
TOTAL SOLIDS, mg/l	55	
BIOCHEMICAL OXYGEN DEMAND, mg/l	-	
CHEMICAL OXYYYGEN DEMAND, mg/l	-	

GENERAL REMARKS:

SIGNED ----- **DATE:** -----

7-3 Water Quality result for Baragoi Dam



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CHEMICAL ANALYSIS ON WATER SAMPLES

SAMPLE SOURCE & DESCRIPTION: BARAGOI DAM WATER
SAMPLED BY: CLIENT

PARAMETER	RESULT	REMARK
p ^H	8.1	
APPARENT COLOUR °H	40	
TRUE COLOUR °H	30	
CONDUCTIVITY μS/CM, mg/l	210	
TURBIDITY, F.T.U	8.0	
CALCIUM HARDNESS AS CaCO ₃ , mg/l	30	
TOTAL HARDNESS AS CaCO ₃ , mg/l	80	
TOTAL ALKALINITY AS CaCO ₃ mg/l	52	
CARBONATE ALKALINITY, mg/l	0	
IRON, mg/l	0.2	
FLOURIDES, mg/l	0	
SULPHATES, mg/l	40	
PHOSPHATES, mg/l	0.03	
SILICA, mg/l	110	
DISSOLVED OXYGEN, p.p.m	5.1	
NITRATES, mg/l	6.2	
MANGANESE, mg/l	0	
CHLORIDES, mg/l	29	
CHROMIUM, mg/l	0.03	
COPPER, mg/l	0.02	
TOTAL COLIFORM/100ml	-	
TOTAL FAECAL COLIFORM/100ml	-	
DISSOLVED SOLIDS, mg/l	100	
SUSPENDED SOLIDS, mg/l	5	
TOTAL SOLIDS, mg/l	105	
BIOCHEMICAL OXYGEN DEMAND, mg/l	-	
CHEMICAL OXYGEN DEMAND, mg/l	-	

GENERAL REMARKS:

SIGNED ----- **DATE:** -----

7-4 Water Quality result for Poro river



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NAIROBI

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CHEMICAL ANALYSIS ON WATER SAMPLES

SAMPLE SOURCE & DESCRIPTION: PORO RIVER WATER

SAMPLED BY: CLIENT

PARAMETER	RESULT	REMARK
pH	7.8	
APPARENT COLOUR °H	5	
TRUE COLOUR °H	<5	
CONDUCTIVITY μ S/CM, mg/l	180	
TURBIDITY, F.T.U	2.9	
CALCIUM HARDNESS AS CaCO ₃ , mg/l	26	
TOTAL HARDNESS AS CaCO ₃ , mg/l	68	
TOTAL ALKALINITY AS CaCO ₃ , mg/l	44	
CARBONATE ALKALINITY, mg/l	0	
IRON, mg/l	0.2	
FLOURIDES, mg/l	0.23	
SULPHATES, mg/l	42	
PHOSPHATES, mg/l	0.04	
SILICA, mg/l	120	
DISSOLVED OXYGEN, p.p.m	5.3	
NITRATES, mg/l	4.1	
MANGANESE, mg/l	0	
CHLORIDES, mg/l	40	
CHROMIUM, mg/l	0	
COPPER, mg/l	0.01	
TOTAL COLIFORM/100ml	-	
TOTAL FAECAL COLIFORM/100ml	-	
DISSOLVED SOLIDS, mg/l	90	
SUSPENDED SOLIDS, mg/l	10	
TOTAL SOLIDS, mg/l	100	
BIOCHEMICAL OXYGEN DEMAND, mg/l	-	
CHEMICAL OXYGEN DEMAND, mg/l	-	

GENERAL REMARKS:

SIGNED _____ DATE: _____