

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE
CONSTRUCTION OF 15 KV KIGALI STRENGTHENING NETWORK PROJECT**

Project Proponent:

RWANDA ENERGY GROUP Ltd
ENERGY UTILITIES CORPORATION LIMITED (EUCL)
KN82 ST 3, Nyarugenge District, Kigali City,
P O Box 537 Kigali, RWANDA.

Submitted to:

RWANDA DEVELOPMENT BOARD (RDB)
Investment Implementation Division
Kigali, RWANDA.

Consultants:

NSIMIYIMANA Fabien: Team Leader
BIRORIMANA Jean Claude: Environment Safeguards Specialist
NSENGIMANA Noel JBaptiste, Environmental & Social Safeguards Specialist
NTIHINYURWA Philippe, Social Safeguards Specialist

EXECUTIVE SUMMARY

Background

The Government of Rwanda, in its effort to sustain economic growth, has increased and stabilized the power production and distribution, hence reducing power shortages. The Government of Rwanda (GoR) also exercises a strong leadership role in donor coordination and has begun to work with donors on a clearer division of labour by identifying areas of individual donor comparative advantage. In connection with the mentioned strategy, the Government of Rwanda through Energy Development Corporation Limited (EDCL) has embarked on a country-wide electricity distribution to realize the primary EDPRS target.

A number of development partners so far committed to support the program including; World Bank IDA, World Bank, African Development Bank, BADEA, OFID, Saudi Funds, Netherlands, Japan, and others.

Due to the fast load growth and development of new infrastructures like building in Kigali City, the existing City electrical network has grown out of supply capacity. There is also no facility for remote switching of these substations, as they have manually operated linked switches, some without fuse. This causes longer down times before power can be restored.

The World Bank as a main donor founded the RESSP with the objective of increasing Access to Electricity Sector with an aim to improve the performance of the electricity sector institution. On the project, they propose to upgrade of 15KV Network in Kigali (Supply overhead lines and underground cables, rehabilitation, construction and upgrade of new or existing substations). However, those activities request an Environment, Social Impact Assessment (ESIA) and proposed mitigation measures appropriate before project implementation.

Objectives of the study

The objective of the assignment is to assist EUCL to develop an Environmental Impact Assessment (EIA) and an Environmental Management Plan (EMP) to ensure that the substations (Cabins) are constructed or upgrade and the improvement of the distribution network in Kigali project is implemented in an environmentally and socially sustainable manner and in full compliance with Rwanda's and World Bank Environmental and Social Policies and Regulations.

Approach and methodology of the study

The methodology of the study involved a preliminary assessment of the project, known as the scoping study; where project literature, preliminary technical studies were reviewed and field visits were done to understand the project, identify its boundaries and relevant stakeholders working in Kigali City especially those who work in electricity sector.

Literature review of Institutional, legislative and policy framework was done with a number of laws, policies, protocols and conventions such as; Organic law determining the modalities of environmental management in Rwanda, Organic law on land management, Resettlement Policy Framework (RPF), Environmental and Social management Framework (ESMF) and natural resources and World Bank environmental and social guidelines.

Public consultation- From the scoping exercise, key stakeholders were identified in two categories. (1) First category of Government officials, (2) Second category of local government officials (Branch Managers). They will no PAPs likely to be affected by the project except one households located near KBC Cabins.

During the Public consultation, the study applied different participatory methods, namely; interviews, one-to-one discussions, focused group discussions (FGD) and official meetings with stakeholders. Discussions were guided key questionnaires, census survey form and stakeholders were asked to raise their concerns on the proposed project. Issue raised by one individual or a group of people was cross-checked by discussing it over with other individuals or groups. It is from these concerns that the likely impacts were determined and summarized in chapter 10.

Baseline data collection- Information was collected on the existing physical, biological, socio-economic environment of Kimihurura, Remera, Gikondo, Muhima, Kacyiru and Nyarugenge Sectors where the project area is identified and implemented.

The *Ecological analysis* involved an Assessment was done of flora and fauna for selected project sites to determine likely eco-sensitive areas and predict flora and fauna that could emerge with the introduction of this project but the impact is very minor.

Social environment analysis- It involved collecting socio-economic primary data from field and matching it with secondary data obtained from desk reviews.

Impact assessment applied number of tools and techniques to determine the nature (positive or negative), extent (spatial), occurrence (one-off, intermitted or constant), magnitude, whether reversible or irreversible, direct or indirect, probability of occurrence and significance with and without mitigation. For each adverse impact identified, its level of significance was indicated, mitigation measures for the predicted impacts were proposed and an Environmental Management Plan (EMP) developed.

A comprehensive report including all collected data, analysis of the data, anticipated impacts, proposed mitigation measures, an Environmental Management Plan and Monitoring Plan has been prepared. This has been shared with EDCL/EARP for inputs and constructive remarks and comments, before World Bank and finally submitted to RDB.

Project Description

The project description consist of:

Components	Capacity
Procurement and Installation Work	
1. 15kv substations (upgrade 11cabins and SCADA)	
(a) 20 MVA 15 KV/400 Transformers	2 units
(b) 15kV switchgear	11 set
(c) Control and supervisory facilities	11 set
2. Transmission Line (Overheaded)	
(a) Two circuits of 15 KV transmission lines from the existing line between Gikondo Dispatching and KBC Cabins (located at Kimihurura Sector)	Approx. 4 km
3. Distribution Line (Underground)	
(a) One circuits of 15 KV distribution lines from Gikondo Dispatching to existing substation (MINISTERE Substation) to Belle Vie Cabins (Near KARAMIRA building)	Approx. 9km
(b) One circuit of 15KV distribution line from KBC Cabins to Christus Substation,	Approx. 6km
(c) One circuit of 15 KV distribution line from Christus Substation to Caisse hyphotecaire Cabins (near Police headquarter).	
4. Rehabilitation of existing Gikondo MV Lines	
(a) Supply 15 KV 2 switchgear panels for outgoing feeder and replace old cables and introduce new control communication facilities.	2 sets

<p>5. Rehabilitation (Upgrade) MV lines of Gikondo Dispatching in Kigali (a) 220mm² single core cable Overhead lines and underground cables and replace towers with new design</p>	<p>2 sets</p>
<p>Procurement Work</p>	
<p>6. Communication and protection Equipment of the Project</p>	<p>1 lot</p>
<p>7. Spare Parts for the Equipment of the Project (conductors, insulators and lattices steels towers)</p>	<p>1 lot</p>
<p>Construction Work</p>	
<p>8. Foundation for the Equipment of the Project (Transformers, Towers for 15 kV Transmission Line, etc.)</p>	<p>1 lot</p>
<p>9. Building of the Project substations (some will be built others upgrade and others will not change)</p>	<p>11 building</p>

Consideration of Alternatives

The selected line routes, location of substations were the most feasible in light of the existing electricity network in the area, most direct line of route, least expropriation effects and the positive project benefits. The alternative of “no-build” is not appealing since electricity is included as a measure of development in these urban areas and therefore is always given high priority in the list of developmental activities for Rwanda. While there will be no high environmental cost from these alternatives, with increasing population the demand for electricity connection increases and hence less power if these new networks are not constructed.

In conclusion, given the nature and location of the project, the potential impacts associated with the proposed electrification project development are of a nature and extent that can be reduced, limited and eliminated by the application of appropriate mitigation measures. As a matter of fact, compliance with the proposed mitigation measures and regular monitoring done as per the Environmental Management and Monitoring Plans issued in the report, the construction of substations and upgrade of transmission and distribution 15KV network in Kigali is bound to be executed in a sustainably efficient manner.

ACRONYMS

ADB	African Development Bank
ARAP	Abbreviated Resettlement Action Plan
BADEA	Banque Arabe de Développement Economique en Afrique
BP	Bank Policies
CAS	Country Assistance Strategy
CFL	Compact Fluorescent Lamp
CEPGL	Economic Community of the Great Lakes Countries
COMESA	Common Market for Eastern and Southern Africa
CSP	Country Strategy Paper
DDP	District Development Plan
EA	Environmental Assessment
EAC	East African Community
EARP	Electricity Access Roll out Programme
EDCL	Energy Development Corporation Limited
EDPRS	Economic Development and Poverty Reduction Strategy
EIA	Environmental Impact Assessment
EUCL	Energy Utility Corporation Limited
ESA	Environmental Security Assessment
ESMF	Environmental and Social Management Framework
FDG	Focus Discussion Group
GEF	Global Environment Facility
GDP	Growth Domestic Product
GoR	Government of Rwanda
HH	Household
IBA	Important Bird Area
IDA	International Development Agency
IMCE	Integrated Management of Critical Ecosystem
IWRM	Integrated Water Resources Management
JICA	Japanese International Corporation Agency
MDG	Millennium Development Goal

MINAGRI	Ministry of Agriculture
MINALOC	Ministry of Local Government
MINEAC	Ministry for East African Community
MINECOFIN	Ministry of Finance and Economic Planning
MININFRA	Ministry of Infrastructure
MINIRENA	Ministry of Natural Resources
N/A	Not Applicable
NAFA	National Agro Forestry Authority
NEPAD	New Partnership for Africa's Development
OFID	OPEC Funds for International Development
OP	Operational Facility
PAP	Project Affected People/ person
PPE	Personal Protective Equipment
PPP	Policy, Plan, or Program
PRSP	Poverty Reduction Strategy Plan
RAP	Resettlement Action Plan
REMA	Rwanda Environment Management Authority
RPF	Resettlement Plan Framework
UNCBD	UN Convention on Biological Diversity
UNCCD	UN Convention to Combat Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	UN Framework Convention on Climate Change
WHO	World Health Organization

GLOSSARY OF TERMS

Environment: The physical factors of the surroundings of the human being including land, water, atmosphere, climate, and the biological factors of fauna and flora as well as the cultural, social, and economic aspects of human activity.

(Adapted from REMA 2006)

Environmental impact: Effects on the environment and natural resources that may be positive and/or negative and produce benefits and/or costs.

(Adapted from REMA 2006)

Environmental Impact Assessment (EIA): The systematic evaluation of a project to determine its impact on the environment and natural resources.

(Adapted from REMA 2006)

Environmental security: A condition in which a nation or region, through sound governance, capable management, and sustainable utilization of its natural resources and environment, takes effective steps toward creating social, economic, and political stability and ensuring the welfare of its population.

Environmental sustainability: Management of natural resources and the environment that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Policy: Strategy with defined objectives, set priorities, rules, and mechanisms to implement objectives.

Plan: Priority, option, or measure for resource allocation according to resource suitability and availability, following the orientation of and implementing relevant sectoral and global policies.

Program: Organized agenda with defined objectives to be achieved during program implementation, with specification of activities and program investments, in the framework of relevant policies and plans.

Project: A detailed proposal, scheme, or design of any development design or development activity, which represents an investment, involves construction works, and implements policy/planning objectives.

Scoping: A process of establishing the principal issues to be addressed in the EIA, the decision criteria, and indicators of desirable outcomes.

Screening: A process of determining whether EIA is required for a specific project

Social sustainability: Social sustainability refers to the continuous betterment of human well-being and welfare through access to health, nutrition, education, shelter, and gainful employment, as well as through maintenance of effective participation in decision-making within and across generations.

Stakeholders: Individuals, communities, government agencies, private organizations, non-governmental organizations, or others having an interest or stake in the EIA process and outcomes of the policies, plans, and/or programs (Adapted from REMA 2006).

Table of Contents

Executive summary.....	1
Glossary of terms	8
Table of contents.....	10
chapter 1. introduction.....	13
1.1. specific objectives of this esia.....	14
1.2. approach and methodology.....	15
1.3.1 scoping.....	15
1.3.2 field visits.....	15
1.3.3 interviews.....	15
1.3.4 identification of significant impacts.....	16
chapter 2. project description.....	17
2.1. background.....	17
2.2. project objectives.....	17
2.3. justification.....	18
2.4. project location.....	18
2.5. project components	19
chapter 3. baseline data and information.....	26
3.1 physical and biological environment.....	26
3.1.1 relief.....	26
3.1.1 climate.....	26
3.1.2 rainfall.....	27
3.1.4 vegetation.....	28
3.1.5 soils	28
3.1.6 cultural heritage.....	29
3.2. socio economic environment.....	29
3.2.1 population and demography.....	29
3.2.2 infrastructure.....	30
foto 3: 31	
3.2.3 energy	31
3.2.4 housing and settlement.....	31

3.2.5 agriculture	32
chapter 4. policy, legal, and administrative framework.....	33
4.1 legislative and policy framework for environmental and social assessment in rwanda	33
4.1.1 constitution of the republic of rwanda.....	33
4.1.2 rwanda vision 2020	33
4.1.3 national environmental policy	33
4.1.4 national environmental law	34
4.1.5 law n° 18/2007 of 19/04/2007 relating to expropriation in the public interest	35
4.1.6 environmental impact assessment regulations, 2006	35
4.1.7 ministerial order n° 003/2008 of 15/08/2008 relating to the requirements and procedure for environmental impact assessment.....	35
4.2. relevant policies	35
4.2.1 national policy on eia	36
4.2.2 energy policy	36
4.2.3 land policy	38
4.2.4 national land law	38
4.2.5 rwanda building control regulations	39
4.3 international legislative framework.....	39
4.3.1 environmental international conventions.....	39
4.3.2 international agreements	40
4.4 world bank environmental and social safeguards policies	41
4.6 institutional framework for environmental management in rwanda.....	44
chapter 5. alternatives and options of the project.....	48
5.1 alternative line routes.....	48
5.2 kbc substation and christus location.....	48
5.3 no project alternative.....	49
5.4 comparison of alternatives.....	50
chapter 6. nature and extent of key environmental and social impacts of the project.....	51
chapter 7. impacts evaluation	59
chapter 8. environmental management plan	69
chapter 9. monitoring plan.....	74

chapter 10. stakeholders consultation and public participation.....	86
chapter 11. conclusion and recommendations	88
11.1 conclusion	88
11.2 recommendations	89
12. references	91
13. appendices.....	93
13.1 list of consulted people	94
13.2 terms of references for eia provided by rdb.....	95

List of Tables

Table 1 Project Administrative location	18
Table 2: Project components.....	19
Table 3: Environmental assessment related agreements	41
Table 4 Scoping matrix	52
Table 5: Impact evaluation.....	59
Table 6: Environmental Management Plan.....	70
Table 7: Environmental Monitoring Plan	79
Table 8: Summary of issues raised during Public consultation	87

List of Figures

Figure 1:Project implementation zone.....	<u>192</u>
Figure 2: Schematic layout of the projects components.....	<u>236</u>
Figure 3: Schematic of the components of a tower.....	<u>257</u>
<u>Figure 4: An example of the components of a tower.....</u>	<u>28</u>
Figure 5: Average temperature map.....	<u>30</u>
Figure 6 Average rainfall map.....	<u>31</u>

List of Photos

Photo 1: Old 15Kv Substation (Cabin) near NISR.....	<u>19</u>
Photo2: New 15Kv Substation {Cabin} constructed near Christus.....	<u>21</u>
Photo 3: Rehabilitation of Gikondo Dispatching.....	<u>31</u>

Chapter 1. INTRODUCTION

The Government of Rwanda, in its effort to sustain economic growth, has increased and stabilized the power production since the severe power shortage in 2004. However, infrastructure bottlenecks in the urban areas and limited access in the rural areas have emerged as a significant constraint. One of three major strategic objectives of the Economic Development and Poverty Reduction Strategy (EDPRS) is to expand access while also improving the quality and lowering the cost of economic infrastructure—especially transport, power and communication.

In this regard, the Government of Rwanda through EDCL has established a new Electricity Access Rollout Program (EARP) as a part of its corporate structure to overcome the electricity transmission and distribution challenges. The activities proposed in the programme are designed to meet the basic electricity needs of individual households, public institution and income generating activities. However, those activities will have potential impacts (both positive and negatives) on the surrounding and connected communities (EDCL, Audit report, 2015).

Reducing the burden of environmental impacts is necessary if development is to become sustainable. As resources become limited, environmental impacts are becoming more complex, and as a result, Environmental and Social Impact Assessment (ESIA) has become of ever increasing importance as a tool for development decision-making.

In practice, EIA is applied primarily to prevent or minimize the adverse effects of major development proposals, such as power stations, dams and reservoirs, industrial complexes, housing estates, hotels, roads, etc. It is also used as a planning tool to promote sustainable development by integrating environmental considerations into a wide range of proposed actions. Most notably, the use of policies and plans to focus on the highest levels of decision making and take care of the environment in considering development alternatives and options.

For this project, the strengthening of 15KV Kigali Network necessary will have adverse impact regarding the promiscuity and unplanned of houses and public infrastructures will be damaged. Realizing the magnitude of the problem, the Government of Rwanda has got

on reforming strong environmental policies, legal and institutional instruments to safeguard the present and future generation to ensure sustainable development basing on Vision 2020.

1.1. Specific objectives of this ESIA

Because of the type and location of the project in an urban, there are likely to be impacts resulting from the implementation the project. The assessment is meant to address:

- Potential environmental impacts at various phases of the project, including; project planning, construction and operational phases.
- Harmony of the proposed project with its surroundings (roads, residences, market, schools, etc.), including the physical environment (land, water and air) and social environment (human health, land amenities, noise, traffic, diseases, etc);
- Conformity of the proposed development with existing Government Policies, World Bank policies and requirements;

The Environmental and Social Impact Assessment (ESIA) was conducted in order to examine, analyse and assess the proposed development so that when the project is implemented it will be environmentally sound and sustainable. The main objectives were to:

- Establish baseline conditions in the project area and surrounding environments and assess how these conditions would be altered by the proposed development;
- Seek and integrate the views of the various stakeholders in the decision making process and implementation of the project;
- Promote consultations among key stakeholders;
- Identify appropriate measures to mitigate the identified negative impacts and enhance the positive impacts of the proposed project;
- Compile an Environmental Impact Statement or report, which will assist in decision making with regard to environmental aspects of the proposed development as well as the viability of the proposed project.

1.2. Approach and methodology

In general, the EIA study team started with the reviewing of all existing information on the proposed project, including project documents available. Information available on other similar or related projects undertaken within the project area was also looked at, review of the relevant Policies, Kigali Master Plan and Gasabo and Nyarugenge District detailed plans, Aerial photography map of the project, policies and regulations of the Government of Rwanda, World Bank.

1.3.1 Scoping

Upon reviewing the existing information on this project, scoping was done to identify the project boundaries, key stakeholders that might be affected or have interest in the development of this project. Scoping also directed the study to the area of interest, likely impact areas and entailed a broad assessment of the baseline data of the project.

The ESIA team carried out a detailed analysis of the proposed project through: field visits, interviews with focal groups, local authorities and Project Affected People (PAPs).

1.3.2 Field visits

Visits were made to the project site to assess the surrounding environment (physical and human) of the proposed project especially the proposed lineroute and substations. In addition, the field visits were used to identify the stakeholders especially those who could be using the land (former stall owners) or will have a claim on it, those who would benefit or be affected by the project. The assessment was that there is no significant impact for affected household's even one household identified in Kimihurura Sector.

1.3.3 Interviews

Interviews were conducted mainly with the Proponent (developer) of the project, branch managers of EUCL, Electricians, local residents, PAPs, Sector and Cell officials among others.....

1.3.4 Identification of significant impacts

After collecting the baseline data from the site visits and interviews with stakeholders, Scoping matrices were prepared that assessed impacts of activities under planning, construction, operation. These impacts were then weighed on their significance based on whether the impact is expected or not, to some extent or unknown. It is those impact activities that were considered in proposing mitigation measures and eventually the environmental management plan.

2.1. BACKGROUND

The Government of Rwanda, in its effort to sustain economic growth, has increased and stabilized the power production and distribution hence reducing power shortages. However, infrastructure bottlenecks in the urban areas and limited access in the rural areas have emerged as a significant constraint. One of three major strategic objectives of the Economic Development and Poverty Reduction Strategy (EDPRS 2013-2017) is to expand access while also improving the quality and lowering the cost of economic infrastructure especially transport, power, and communications. The Government of Rwanda (GoR) also exercises a strong leadership role in donor coordination and has begun to work with donors on a clearer division of labour by identifying areas of individual donor comparative advantage.

In connection with the mentioned strategy, the Government of Rwanda through Energy Development Corporation Limited (EDCL) is embarked on a country-wide electricity distribution to realize the primary EDPRS target. The company targeted to connect more household and public institutions, also capacity strengthening and implementation support. That why, the rehabilitation of electricity infrastructures in Kigali City remained a priority?

2.2. PROJECT OBJECTIVES

The main objective of the project being the increased electricity supply in Rwanda and upgrade 15kv distribution network particular Kigali City below is the specific objectives:

- To construct the new Substations (some of 11 Cabins) or upgraded existing ones,
- To construct a new double circuit 15kV Overhead transmission lines. i.e. Connecting from the existing line Gikondo dispatching to KBC substation.
- 15KV Strengthening connection between selected Cabins in Kigali City.
- Installation communication facilities into Cabins and other accessories.
- Fiber Optic cable installation

2.3. JUSTIFICATION

Justification for the proposal of this project can be discussed on the following terms:

- i. The 15kV Strengthening Kigali networks were proposed to increase on the amount of power supplied to the Kigali Down Town.
- ii. Upgrade and construct electricity substation in Kigali City was proposed to reduce on the strain on the existing line from KBC supplying to Christus supply and from Gikondo supply to Karamira supply , which currently has low quantities of power.

In general the purpose of the project is to increase amounts of power supplied to urban areas of Remera, Gikondo, Kacyiru and Nyarugenge in Gasabo and Nyarugenge Districts.

2.4. PROJECT LOCATION

The Project area is located in Gasabo, Nyarugenge, Kicukiro Districts of Kigali City. The project components cover the following areas:

Table 1: Project Administrative location in Kigali City.

Sectors	Cells
Remera	Nyarutarama
	Nyabisindu
Gikondo	Kinunga
Nyarugenge	Kiyovu
Kimihurura	Rugando
	Kamukina
	Kimihurura
Muhima	Ubumwe
	Rugenge
	Amahoro
Kacyiru	Kamatamu
	Kibaza

Table 2: Project components

Components	Capacity
Procurement and Installation Work	
<p>1. 15kv substations (upgrade 11cabins and purchase SCADA)</p> <p>(a) 20 MVA /15 kV transformers</p> <p>(c) 15kV switchgear</p> <p>(d) Control and supervisory facilities</p>	<p>11 units</p> <p>1 set</p> <p>1 set</p>
2. Transmission Line	
<p>(a) Two circuits of 15 kV transmission lines from the non-existing line between KBC Cabins, Minijust and Nyarutarama I and existing ones between Nyarutarama I and Christus Cabins</p>	<p>Approx. 2.2 km</p>
3. Distribution Line	
<p>(a) Two circuits of 15 kV distribution lines from Gikondo Dispatching to existing line between Ministere and Belle vie</p>	<p>Approx. 4k m</p>
<p>(b) One circuit of 15 kV distribution line at Ministere to CHK (about 1km)</p>	<p>Approx. 1km</p>
<p>(c) One circuit of 15 kV distribution line from existing Minister to Boulevard Central Switching Station.</p>	<p>Approx. 500 m</p>
4. Rehabilitation of existing Gikondo Substation and KBC Substation	
<p>(a) 15 kV switchgear panel for outgoing feeder to KBC substation</p>	<p>1 set</p>
5. Upgrade of 15 Kv Network in Kigali	
<p>(a) 220mm² single core cable Overhead lines and underground</p>	<p>2 sets</p>
Procurement Work	
<p>1. Communication and protection Equipment of the Project</p>	<p>1 lot</p>

Spare Parts for the Equipment of the Project (conductors, insulators and lattices steels towers)	1 lot
Fiber Optic Purchase	1lot
Construction Work	
1. Foundation for the Equipment of the Project (Transformers, Towers for 15 kV Transmission Line, etc.)	1 lot
Building of the Project (KBC substation, Christus and Ministere RMU Switching Stations)	11 building

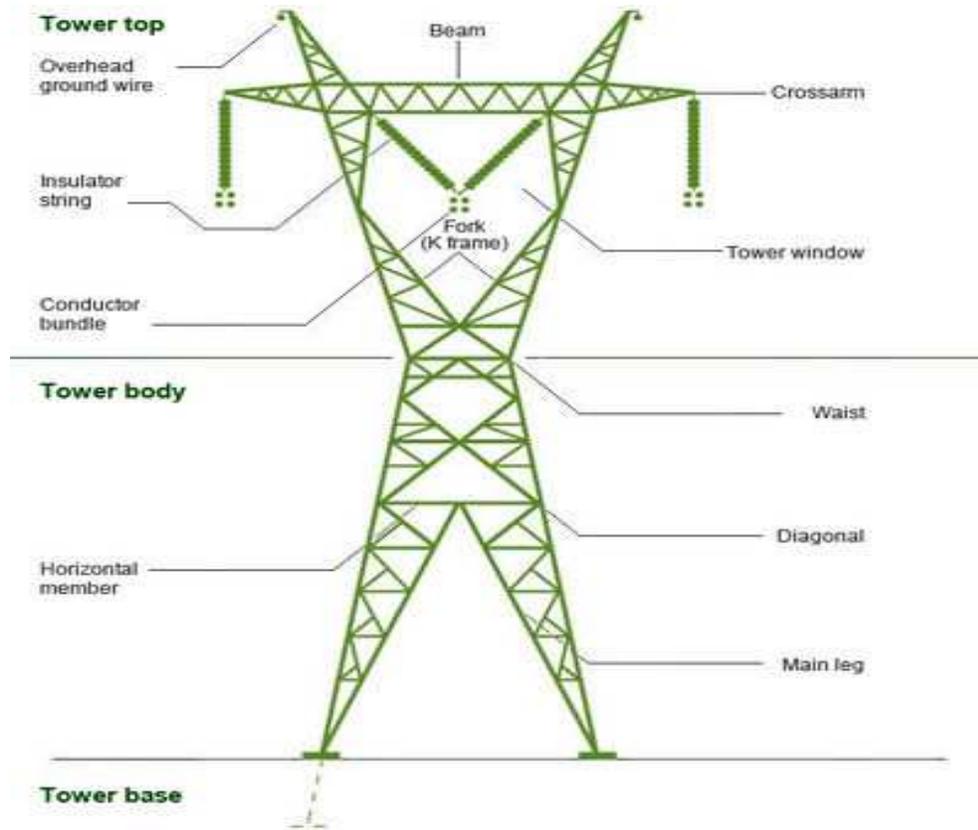


Photo: New 15Kv Substation {Cabin} constructed near Christus/Remera



Figure 2: Schematic layout of the projects component.

The project shall involve construction of towers and electric poles. An example of what the components of a tower would look like is shown in the figure below.



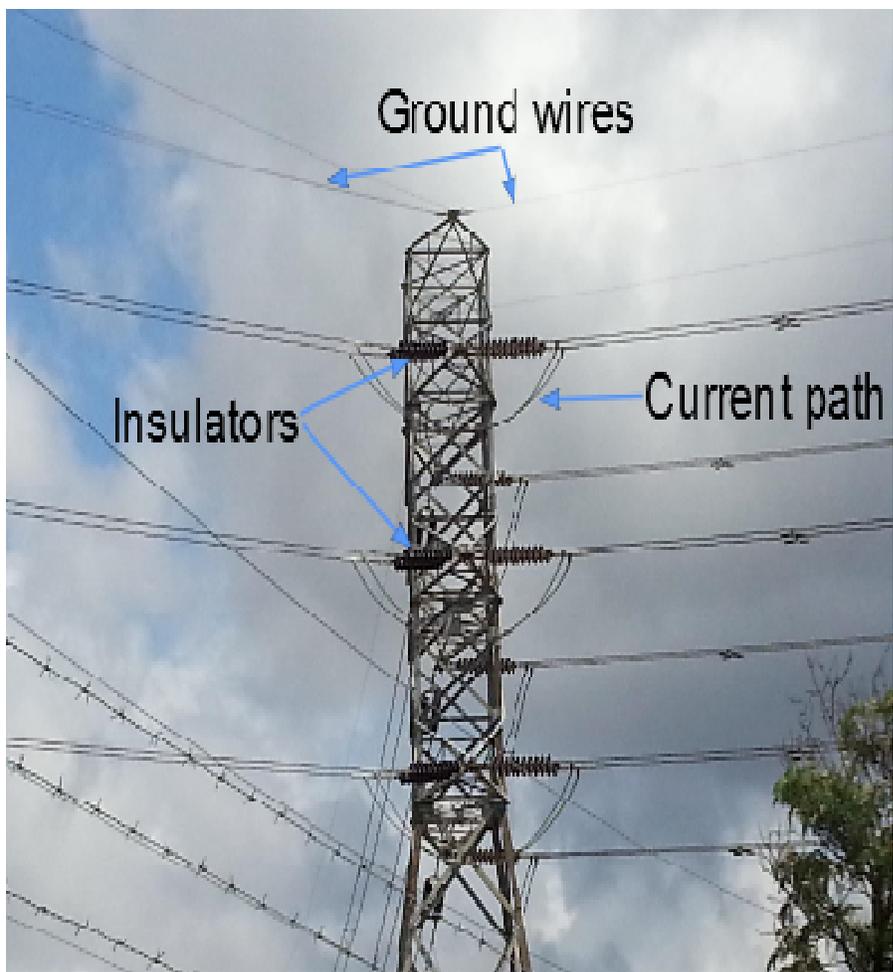


Figure 4: An example of components of a tower

Chapter 3. BASELINE DATA AND INFORMATION

This chapter gives background information of the project area as a whole in terms of its location, human, social and environment attributes which will play a crucial role in the identification of potential impact of the project. It's about to give some physical and socio environmental description and try to assess adverse impact on urban community.

3.1 Physical and Biological Environment

Physical environmental description involves understanding the actual status of the area including the subject site and surrounds, in regard to; Climate, temperature, rainfall, relief, hydrology, vegetation, soil, water and air quality. Physical parameters of the site are discussed hereafter.

3.1.1 Relief

The project area covering three Sectors (Kacyiru, Remera and Kimihurura) of Gasabo district and two Sectors (Gikondo and Nyarugenge) of Nyarugenge Districts located in Kigali City, recognized as a hilly plateau with large wetlands (Nyabugogo or Rugende Wetlands). It is situated on a slope in range of 1472.5-1492.5m above sea level at the crest of the hill, fairly flat with a slope percentage of 6-16%. The site slopes gently over a 20m fall from the northern boundary down to the south eastern corner.

3.1.1 Climate

The average annual temperature for the intervention area (Kigali city/ Gasabo and Nyarugenge Districts) will rise slightly above 18°C but not exceeding 25°C, during the dry season, while it might drop to 15°C in the wet season as the figure below indicates.

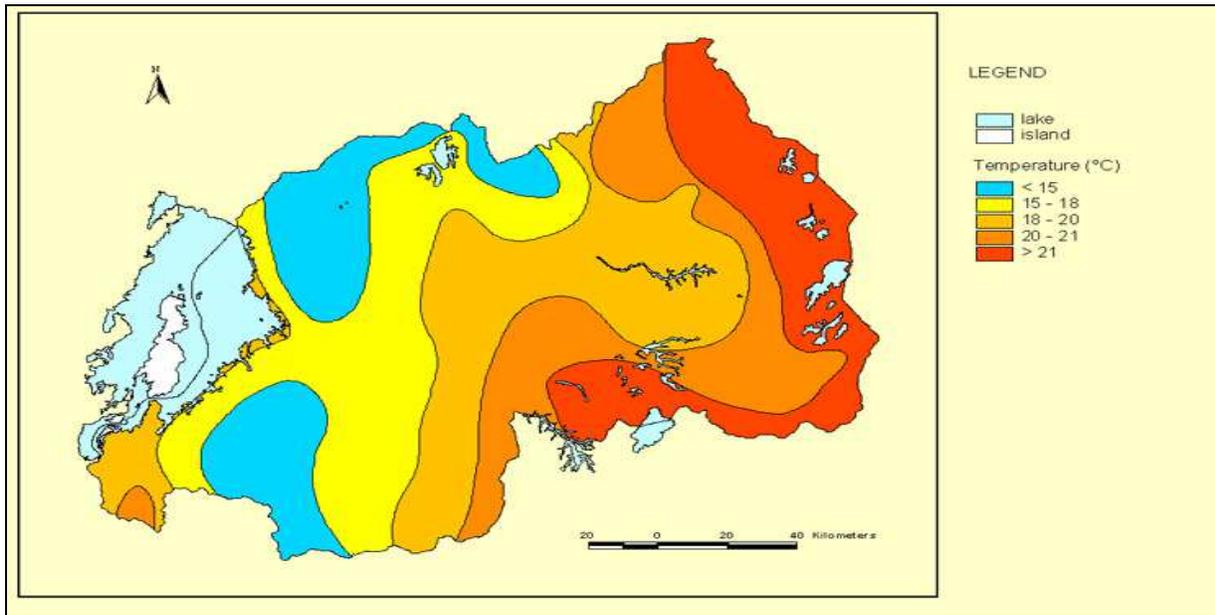


Figure 5: Average temperature map

3.1.2 Rainfall

The rainfall characteristics for Rwanda are known to exhibit large temporal and spatial variation due to varied topography and existence of large water bodies near the country. However, two rainy seasons are generally distinguishable; one centred on March – May and the other on October – December. For the area of concern, rainfall averages in the range of 1000-1200mm/yr, as may be observed from the figure below, in the central region of the country

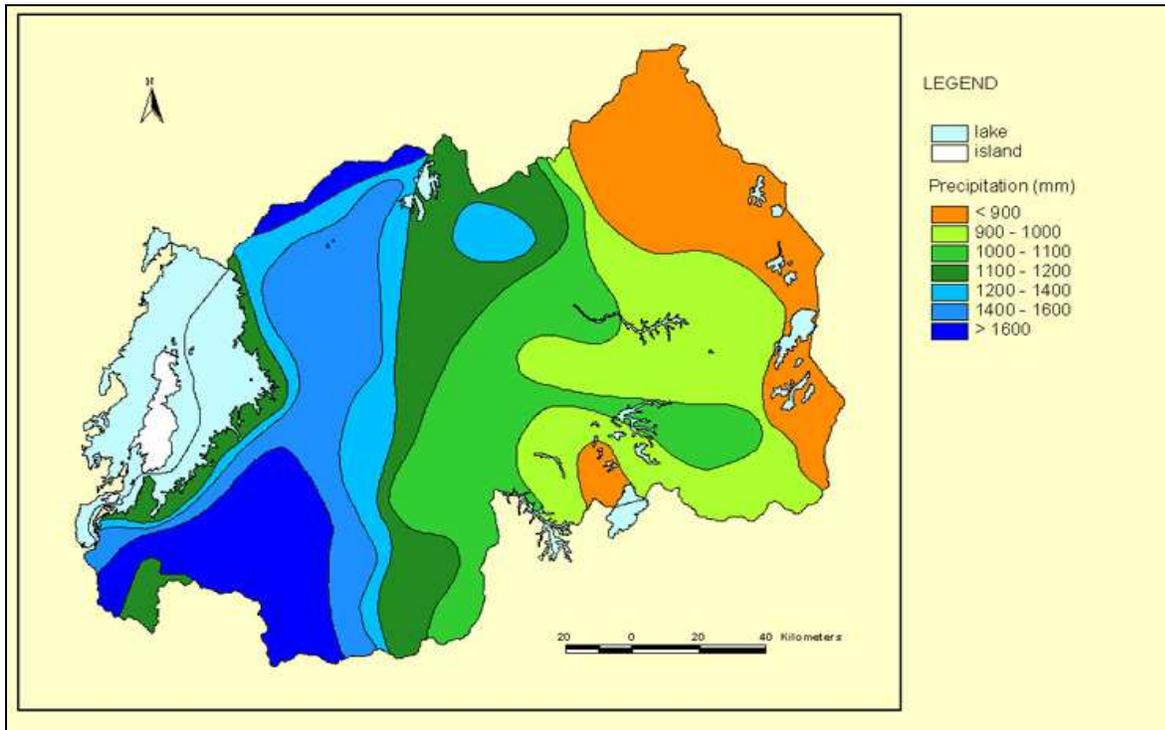


Figure 6: Average rainfall map

3.1.4 Vegetation

The site is mostly a populated land. The surrounding “natural vegetation” is now comprised of secondary disturbed vegetation, primarily shrubs, herbaceous plants and several species of grasses, including razor grass. There was no evidence of wildlife within and around the project site during the field visits. Dense population is a strong contributor to this state. From the assessment of the project area and interviews with the locals, there is no protected plant species mentioned in the Ministerial order No. 007/2008, article 4 II identified at project site.

3.1.5 Soils

The general soil structure observed in the project area is the result of the high rainfall and weathering of base rock material resulting in a uniform friable loam topsoil “A” horizon of around 100 – 200 mm in undisturbed areas overlaid over a finer more compacted clayey “B” horizon of 1000 to 3000 mm depth. This surface topsoil is generally very compacted especially in areas of buildings where the platforms created for the buildings have exposed the heavier subsoil’s and this results in an impervious surface with high runoff.

Generally, the soil is dominated by Granitic and met-sedimentary rocks underlie the City of Kigali; these include schists, sandstones and siltstones. Lateritic soils, rich in iron and aluminium, dominate the city's hillside surfaces while alluvial soils (fertile soil deposited in river valleys) and organic soils are found in the lowlands and wetlands. Inappropriate development on Kigali's hills slopes has caused extensive soil erosion in some areas.

3.1.6 Cultural heritage

During the site investigation, the team was particularly interested in the possibility of finding existing tangible or intangible cultural heritage, such as; archaeological, religious, cultural sites, spiritual sacred features, battle grounds, cemeteries, among others. (*World Bank OP 4.11 physical cultural resources*).

The study was not able to identify any significant cultural heritage in this area, as matter of fact consultations with the locals and university scholars from National University of Rwanda and records of the National Museum of Rwanda informed us that this site had not been used for any cultural heritage. (*National Museum of Rwanda, list of historical, cultural and archaeological sites in Rwanda, 2008*)

3.2. Socio Economic Environment

This section attempts to understand the current social status versus the likely effects of the proposed project. It involves collecting primary data from field investigations, group meetings, public consultations and expert field observations. It therefore describes the baseline of the socio-economic parameters of the area before project implementation. Some of the parameters that were discussed are; population and demography, land use, infrastructure (roads, water, electricity), health and sanitation, education, etc.

3.2.1 Population and demography

According to the preliminary results of the fourth population and Housing census (2012) indicated that Gasabo district has a population of 530,907 representing 46.8% of the total population for Kigali City (1,135,428 population) and 5% of the total national population (10,537,222). At the districts level comparisons, Gasabo and Nyagatare are the districts with the highest population constituting 50% and 42% of the total population. In addition,

the EICV3 revealed that a significant proportion of households are headed by women and widows at 26.1 % and 17.8 % respectively.

Kigali City is home to 10.8% of Rwanda total population and is one of the fastest-growing cities due to a high rate and high level of positive net migration. Between 1962 and 2012, its administrative boundaries grew from about 3 sq.km to 730 sq.km and its population increased from some 6000 to more than one million people. The average male-to-female ratio is 106 to 100, and 73 per cent of its total population is under the age of 30.

3.2.2 Infrastructure

The infrastructure within the general project location is relatively established. There is a network of accessible roads providing access to most areas.

Component 15kV Distribution line from KBC Cabins- Christus Cabins- The road to KBC SS is Asphalt roads.

15kV Transmission line from Gikondo existing line to proposed MINECOFIN SS- The road is asphalt roads

Around the project site there is electricity provided through the national grid. Water is available through the main water supply from nearby WASAC sources. Telephony services are available through provision of towers and a variety of wireless telephone networks from telephone companies are available.

Building on steep slopes, seasonal rainfall, inadequate drainage and construction in flood prone zones have made parts of Kigali highly susceptible to flooding. The impacts of changing climate could exacerbate the risks. Disaster management is becoming decentralised to help prevent such hazards (ESMF-EUCL,2015)



Photo 3: Rehabilitation of Gikondo Dispatching

3.2.3 Energy

The main sources of energy used for cooking are: firewood and charcoal. Charcoal is the energy source most used in cooking in urban areas. This use is among the direct causes of environmental degradation in the country resulting in disorderly exploitation of forests. For lighting, energy sources used are REG electricity, lamp oil, lanterns, candles and wood. 56% of households have electricity for lighting compared to the national average of 12%, while charcoal is surpassing wood as the primary source of cooking fuel, serving 51% of households. Modernising energy provision will help reduce respiratory disease, deforestation and contributing to anticipate, mitigate and help to adapt on Climate Change (ESMF-2015).

3.2.4 Housing and Settlement

In Rwanda settlement in urban areas like Kigali City, the urban centers are developed spontaneously without taking environmental into consideration.

The housing in the Districts of Gasabo and Nyarugenge is characterized by four different types: the well-developed urban area, urban areas in settlements, villages (imidugudu) in rural areas and houses scattered in rural areas.

For the project area in the urban areas, quarter are spontaneous and unplanned, most of the houses are built in earth brick and timber and roofed in iron sheet. Sanitary facilities are insufficient and sometimes inadequate. Solid wastes are piled in disorder, drinking water is rare and rainwater draining gutters are insufficient (ESMF-EUCL.2015).

3.2.5 Agriculture

Agricultural activity is developed in the 8 rural areas of Gasabo and Nyarugenge District. However with the expansion of the City there will be more and more loss in agricultural space. The project area is relatively fertile and crops such as; maize, cassava, banana, beans, and vegetables are mostly grown in this area.

4.1 Legislative and policy framework for environmental and social assessment in Rwanda

4.1.1 Constitution of the Republic of Rwanda

In consideration of the Constitution of the Republic of Rwanda of June 4, 2003 as amended to 2015, article 53 states that every citizen is entitled to a healthy and satisfying environment. Every person has the duty to protect, safeguard and promote the environment. The state shall protect the environment. The law determines the modalities for protecting, safeguarding and promoting the environment.

4.1.2 Rwanda Vision 2020

The vision 2020 of Rwanda gives strategic actions and inter alia institutes the principle of precaution to mitigate the negative effects caused to the environment by the socio-economic activities, to institute the “polluter pays” principle as well as preventive and penal measures to ensure the safeguard of the environment and to require the environmental impact study of any development project.

4.1.3 National Environmental Policy

The overall objective of the Environmental Policy is the improvement of man’s wellbeing, the judicious utilization of natural resources and the protection and rational management of ecosystems for a sustainable and fair development.

The Policy seeks to achieve this through the following objectives:

- i. To improve the health and the quality of life for every citizen and promote sustainable socio-economic development through a rational management and utilization of resources and environment;

- ii. To integrate environmental aspects into all the development policies, planning and in all activities carried out at the national, provincial and local level, with the full participation of the population;
- iii. To conserve, preserve and restore ecosystems and maintain ecological and systems functioning, which are life supports, particularly the conservation of national biological diversity;
- iv. Optimum utilization of resources and attain a sustainable level of consumption of resources;
- v. To create awareness among the public to understand and appreciate the relationship between environment and development;
- vi. To ensure the participation of individuals and the community in the activities for the improvement of environment with special attention to women and the youth and
- vii. To ensure the meeting of the basic needs of today's population and those of future generations.

4.1.4 National Environmental Law

The Organic Law n° 04/2005 of 08/04/2005 determining modalities of protection, conservation and promotion of environment in Rwanda regulates the Environmental impact Assessments. In its article 67: Every project shall be subjected to environmental impact assessment, before obtaining authorization for its implementation. This applies to programmes and policies that may affect the environment. Article 68 specifies the main points that an Environmental Impact Assessment must include. Article 69 stipulates that the environmental impact assessment shall be examined and approved by the Rwanda Environmental Management Authority or any other person given a written authorization by the Authority.

The environment impact assessment shall be carried out at the expense of the promoter. Article 70 states that an order of the Minister having environment in his attributions establishes the list of projects for which the public administration shall not warrant any authorization without an Environmental Impact Assessment describing direct and indirect consequences of the project to the environment.

4.1.5 Law N° 18/2007 of 19/04/2007 relating to expropriation in the public interest

The law defines the activities or projects that can be classified as public interest and process and requirements for expropriation activities as well as the cost for goods and other infrastructure to be expropriated. The law provides a window for appeal for somebody who is not satisfied by the cost of compensation.

4.1.6 Environmental Impact Assessment Regulations, 2006

REMA has now developed the EIA regulations which provide a guide and requirements for EIA in Rwanda. According to these new regulations, Article 1 makes it mandatory for all the projects listed under schedule I to be subjected to a full scale EIA.

The Article further states that no environmental authorization shall be granted by the Authority for any project in Schedule I to these Regulations if no environmental impact assessment has been submitted to the Authority in accordance with the provisions of these Regulations. The Article states that any project listed under Impact Level III of Schedule I to these Regulations shall require a full environmental impact assessment by preparation of an environmental impact report, unless the Authority refuses permission.

4.1.7 Ministerial order N° 003/2008 of 15/08/2008 relating to the requirements and procedure for Environmental Impact Assessment

Article 1 stipulates that Environmental Impact study is a systematic way of identifying environmental, social and economic impacts of a project before a decision of its acceptance is made. In article 3, the developer submits an official application which includes a project brief of the proposed project to the authority. Article 4 specifies that within thirty (30) calendar days after receipt of the project brief and after its analysis, the Authority shall submit the Terms of reference to the developer for the Environmental impact study.

4.2. Relevant policies

4.2.1 National Policy on EIA

The Constitution of the Republic of Rwanda, adopted in June 2003, ensures the protection and sustainable management of environment and encourages rational use of natural resources. Organic Law (No. 04/2005 of 08/04/2005) and various socioeconomic development policies and strategies such as “Rwanda Investment and Exports Strategic Action Plan, 2005-2007” and “Vision 2020” call for a well regulated environment management system that takes into account principles of sustainable development while at the same time contributing to poverty reduction.

The Organic Law (Article 67) requires that projects, programmes and policies that may affect the environment shall be subjected to environmental impact assessment before obtaining authorisation for implementation. Article 69 gives REMA legal authority to oversee the conduct of EIA.

EIA is an invaluable tool for environmental management in a trans-boundary context, playing role in information dissemination between Rwanda and neighbouring countries and widening the scope of understanding of impacts beyond its borders. EIA process in Rwanda provides a pretext and basis for future international cooperation and conflict resolution concerning environmental impacts at a regional level.

4.2.2 Energy Policy

The national policy goal is to meet the energy challenges and needs of the Rwandan population for economic and social development in an environmentally sound and sustainable manner.

Since 1994, the energy sector as well as the overall economy has gone through structural modifications, where the role of the Government has changed, markets have been liberalised and private sector initiatives encouraged. Hence, the energy policy document has to take into account structural changes in the economy and political transformations at national and international levels.

The national policy objective for the development of the energy sector is to provide an input in the development process by establishing an efficient energy production, procurement, transportation, distribution, and end-user systems in an environmentally sound manner.

The Energy Policy, therefore, focuses on market mechanisms and means to reach the objective, and achieve an efficient energy sector with a balance between national and commercial interests.

An interactive and participatory process between Government, other stakeholders and relevant groups has been necessary as part of the formulation process in order to incorporate views of market actors and energy consumers to address the complex nature of the sector. Specifically, the energy policy takes into consideration the need to:

- i. Have affordable and reliable energy supplies country wide;
- ii. Reform the market for energy services and establishes an adequate institutional framework, which facilitates investment, expansion of services, efficient pricing mechanisms and other financial incentives;
- iii. Enhance the development and utilisation of indigenous and renewable energy sources and technologies,
- iv. Adequately take into account environmental considerations for all energy activities,
- v. Increase energy efficiency and conservation in all sectors; and
- vi. Increase energy education and build gender-balanced capacity in energy planning, implementation and monitoring.

Domestic energy demand has grown rapidly due to population growth and the increase in economic activities especially during the last ten years. The vision of the energy sector is to effectively contribute to the growth of the national economy and thereby improve the standard of living for the entire nation in a sustainable and environmentally sound manner. The mission of the energy sector is to create conditions for the provision of safe, reliable, efficient, cost-effective and environmentally appropriate energy services to all sectors on a sustainable basis. By fulfilling its vision and mission, the energy sector will contribute to social economic development, and in the long-term framework, poverty reduction.

The national energy policy objectives are to ensure availability of reliable and affordable energy supplies and their use in a rational and sustainable manner in order to support

national development goals. The national energy policy, therefore, aims to establish an efficient energy production, procurement, transportation, distribution and end-use systems in an environmentally sound and sustainable manner.

4.2.3 Land Policy

Apart from a few scattered land regulations, most of which date back to the colonial period, Rwanda has never had a proper land policy nor has it ever had a land law, a situation that enhances the existing duality between the very restrictive written law and the widely practised customary law, giving rise to insecurity, instability and precariousness of land tenure.

The Rwandan Government, therefore, found it compelling and necessary to establish a national land policy that would guarantee a safe and stable form of land tenure, and bring about a rational and planned use of land while ensuring sound land management and an efficient land administration.

Currently, the land tenure system in Rwanda operates in a dual legal system: On one hand, there is: the customary law, which governs almost all the rural land and promotes the excessive parcelling out of plots through the successive father-to-son inheritance system. And on the other, there is the written law, which mostly governs land in urban districts and some rural lands managed by churches and other natural and legal persons. This law confers several land tenure rights to individuals such as land tenancy, long term lease and title deeds (particularly in towns).

4.2.4 National Land Law

Land ownership in Rwanda is determined by the Organic law N°08/2005 of 14/07/2005 determining the use and management of Land in Rwanda. It also institutes the principles that are respected on land legal rights accepted on any land in the country as well as all other appendages whether natural or artificial. The Law provides the definitions of some key words:

- Construction area is an area purposely for human settlement, trade and industries, an area reserved for recreation and other basic activities of public utility.

- Area not for construction is an area reserved for agriculture, afforestation, grazing, reserved tourist places and recreational gardens.
- The ownership of Land is determined by article 4, which announces that, any person or association with legal personality has the right over the land and to freely exploit it as provided for by this organic law in article 5 and 6.

4.2.5 Rwanda building control regulations

The Rwanda Building Control Regulations serves as a standard reference for the regulation of planning and design of all buildings in Rwanda. The regulations will facilitate professional practice in the construction sector and reduce the emergence of informal developments so as to ensure well planned and safe building and housing facilities which are environmental friendly in the country. The document also provides regulations in the different areas including electrical installations; Safety: equipment, escape routes and fire alarm; Site activities: construction and site operations etc.

4.3 International legislative framework

4.3.1 Environmental International Conventions

Rwanda has signed and ratified the following environmental international conventions which are to some extent in line with this project and the national policies and laws:

- The international Convention on Biological diversity and its habitat signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 017/01 of 18 March 1995;
- The CARTAGENA protocol on biodiversity to the Convention on Biological biodiversity signed in NAIROBI from May 15, to 26, 2000 and in NEW YORK from June 5, 2000 to June 4, 2001 as authorized to be ratified by Law No 38/2003 of 29 December 2003;
- The United Nations framework Convention on Climate Change, signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 021/01 of 30 May 1995;
- The Kyoto Protocol to the framework on climate c h a n g e adopted at Kyoto on March 6, 1998 as authorized to be ratified by Law No 36/2003 of December 2003;

- The RAMSAR International Convention of February 2, 1971 on Wetlands of International importance, especially as water flows habitats as authorized to be ratified by Law No 37/2003 of 29 December 2003;
- The STOCKHOLM Convention on persistent organic pollutants, signed in STOCKHOLM on 22 May 2001, as approved by Presidential Order No 78/01 of 8 July 2002;
- The ROTTERDAM International Convention on the establishment of the international procedures agreed by states on commercial transactions of agricultural pesticides and other poisonous products, signed in ROTTERDAM on 11 September 1998 and in New York from 12 November 1998 to 10 September 1999 as approved by Presidential Order No 28/01 of August 2003 approving the membership of Rwanda;
- The Basel Convention on the Control of Transboundary Movements of Hazardous wastes and their disposal as adopted at Basel on 22 March 1989, and approved by Presidential Order No 29/01 of 24 August 2003 approving the membership of Rwanda;
- The Montreal International Conventional on Substances that deplete the Ozone layer, signed in London (1990), Copenhagen (1992), Montreal (1997), BEIJING (1999), especially in its article 2 of London amendments and Article 3 of Copenhagen, Montreal and Beijing amendments as approved by Presidential Order no 30/01 of 24 August 2003 related to the membership of Rwanda;
- The Bonn Convention opened for signature on June 23, 1979 on conservation of migratory species of wild animals as authorized to be ratified by Law No 35/2003 of 29 December 2003;
- The Washington agreement of March 3, 1973 on International trade in endangered species of Wild Flora and Fauna as authorized to be ratified by presidential Order No 211 of 25 June 1980.

4.3.2 International agreements

The following table indicates different agreements, date of signature and date of ratification where Rwanda is a signatory:

Table 3: Environmental assessment related agreements

No	Agreement	Date of signature	Date of ratification
1	Agreement on the biological diversity	10/06/1992	18/03/1995
2	Agreement - Context of the United NATIONS on the climate changes	10/06/1992	18/08/1998
3	Agreement related to the fight against desertification	10/06/1992	22/10/1998
4	The agreement Vienna on the protection of the ozone layer		6/12/2002
5	Agreement of Ramsar related to humid zones of international importance particularly the wild housing	1971	6/6/2003
6	International Agreement for the trade of the species in the process of disappearance (IATSPD)	20/10/1980	18/01/1981
7	Conservation Agreement of the animals of the migrating wild species (CMS)	23/06/1979	06/06/2003
8	African Agreement on the nature conservation and natural resources	15/09/1968	20/05/1975

These treaties and international agreements are relevant for the protection and the conservation of the environment and in particular the biodiversity in Rwanda together with the mobilization of funds as well at the bilateral and multilateral level.

4.4 World Bank Environmental and Social Safeguards Policies

World Bank Operational Policies (OP) and Bank Procedures (BP) Environmental Assessment - BP4.01 and OP 4.01 (January 1999 all of which require environmental assessment of projects proposed for World Bank financing to help ensure that they are environmentally sound and sustainable. The World Bank provides guidance on EA requirements through the Environmental Assessment Sourcebook (World Bank 1994) which includes sectoral guidelines. The World Bank EA process is implemented through a

set of Operational Policies/Directives whose primary objective is to ensure that Bank operations do not cause adverse impacts and those they “do no harm”. These safeguard policies are grouped into Environment, Rural Development, Social Development and International Law.

The following safeguard policies have been considered in this EIA.

OP/BP 4.01 Environmental Assessment (January 1999)

Environmental Assessment is one of the 10 safeguard policies of the World Bank. The World Bank Environment and Social Safeguard Policy aims at improving decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted.

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01. The World Bank system assigns a project to one of three project categories, as defined below:

Category A: Environmental Assessments are normally required because the project may have diverse significant impacts (projects in this category are forestry, large industrial plants, irrigation and drainage, mineral development (including oil and gas), pipelines (oil, gas, and water), resettlement, rural roads, tourism, urban development, large transmission lines, etc.).

Category B: A limited environmental analysis is appropriate, as the project may have specific environmental impacts. Projects in this category include agro-industries (small scale), aquaculture & marine culture, small industries, mini-hydropower station, public facilities (hospitals, schools, housing complexes, rural electrification, telecommunications, small-scale tourism, rural water supply, etc.

Category C: Environmental analysis is normally unnecessary, as the project is unlikely to have significant environmental impacts. Projects in this category include education, family planning, nutrition, institutional development, technical assistance, etc.

OP/BP 4.04 Natural Habitats (Jun 2001)

The Bank supports the conservation of natural habitats and the maintenance of ecological functions as a basis for sustainable development. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

OP/BP 4.11 Physical Cultural Resource (July 2006)

Cultural property is defined to include both remains left by previous human inhabitants (e.g. middens, shrines) and unique natural environmental features such as canyons and waterfalls. The Bank does not support projects that will significantly damage non-replicable cultural property and assists only those projects that are sited or designed so as to prevent such damage.

OP/BP 4.12 Involuntary Resettlement (December 2001)

Details involuntary resettlement, emphasizing the severe economic, social and environmental risks, if unmitigated. It ensures that the population displaced by a project receives benefits from it and also covers those with usufruct or customary rights to land or other resources taken for the project. The Operational Policy is specifically inclusive, ensuring that all those affected both directly and indirectly by project developments are compensated as part of the project. Affected population, include those with income derived from informal sector and non-farm activities, and from common property resources. The absence of legal title does not limit rights to compensation. The World Bank's Policy objectives urge that involuntary resettlement be avoided whenever possible. If unavoidable, displaced persons need to:

- Share in project benefits,
- Participate in planning and implementation of resettlement programs, and
- Be assisted in their efforts to improve their livelihoods or standard of livings or at least to restore them, in real terms, to pre-displacement levels or levels prevailing prior to the beginning of project implementation, whichever is higher.

OP 7.60: Disputed Areas

Operational Policy (OP)/Bank Procedure (BP) 7.60: Projects in Disputed Areas may affect the relations between the Bank and its borrowers, and between the claimants to the disputed area. Therefore, the Bank will only finance projects in disputed areas when either there is no objection from the other claimant to the disputed area, or when the special circumstances of the case support Bank financing, notwithstanding the objection. The policy details those special circumstances. In such cases, the project documents should include a statement emphasizing that by supporting the project, the Bank does not intend to make any judgment on the legal or other status of the territories concerned or to prejudice the final determination of the parties' claims.

4.6 Institutional framework for environmental management in Rwanda

The institutional framework for environmental management is currently enshrined in the Organic Law determining the modalities of protection, conservation and promotion of the environment in Rwanda, published in the Official Gazette RWA N° 9 of the 1st May 2005, particularly in its chapter III relating to the establishment of the institutions.

In Rwanda, the implementation of natural resources management and environment policies and sectoral strategies involves several stakeholders, including government state institutions, NGOs, civil society, the private sector, decentralised entities and donors.

Likewise, at regional levels, many actors in the five member countries are involved in carrying out environmental management interventions at different levels, using different modalities and applying different standards. In order to co-ordinate and harmonise different management approaches besides policies, laws, regulations, agreements and standards.

Ministry of Natural Resources (MINIRENA)

MINIRENA is a multispectral ministry covering five sectors: Lands, Water Resources, Forest, Mining and Environment. Environment is a cross cutting sector because it covers the four other sectors. MINIRENA is responsible for the development of policies, laws and regulations as well as coordination of all activities in the management of land, water

resources, forest, mining activities and environment, as well as their follow up and evaluation.

Other key Ministries and institutions

- **MININFRA:** is responsible for setting policies related to energy including electricity; urbanization and settlements; road and communication infrastructure; Meteorology, Urban Water supply. MININFRA oversees the resettlement and housing of people. The Ministry is also charged with constructing infrastructures that protect the environment where different assessments are prioritized. Besides organizing human settlement MININFRA has the mandate for town planning, public infrastructure and transport; the management of water supply as well as actions to encourage water harvesting in the settlement and housing sector.
- **MINALOC:** Under the framework of decentralization, MINALOC oversees the implementation of the decentralization process as well as relevant community and social protection programmes. This Ministry is also responsible for environment governance and therefore for mobilizing the public to participate in the management and protection of natural resources.

Districts are responsible for production and protection of water, tourism, and the environment. Similarly, cities, towns, and municipalities are responsible for land and environmental management, urban planning, road maintenance, maintenance of protected and recreational areas, and providing drinking water, sanitation, and waste treatment and disposal. MINALOC is over-seeing various community environment management related programmes in the districts. These include: Vision 2020 Umurenge, HIMO, Ubudehe and CDF which involve poor communities to participate in various initiatives aimed at enhancing their income.

- **MINECOFIN:** is responsible for Macroeconomic policy instruments, resource mobilization, and coordination of development partners and allocation of budgets to different Ministries and sectors. MINECOFIN is also charged with overseeing and

advising on the formation of various Funds (including the Environment and Forestry Funds). It is also concerned with mainstreaming natural resources and environment concerns in the budgetary, PRSP and DDP processes.

- **MIGEPROFE:** sets policies and guidelines for mainstreaming gender in formulation and implementation of central and local governments' programmes. The Ministry is mandated to guide MININERA and local governments to mainstream gender related issues in natural resource and environment management and mobilize communities (women, men and youth) in the activities of natural resource and environment protection and management.
- **MINEDUC:** is responsible for training human resources in the management and protection of natural resources; It oversees the implementation of environmental education programmes in schools (by supporting Environmental Clubs), as well as initiating the process of mainstreaming environmental assessment into schools.
- **Rwanda Environment Management Authority (REMA):** in 2006, Rwanda Environment Management Authority (REMA) was established to act as the implementation organ of environment-related policies and laws. REMA is also tasked to coordinate different environmental protection activities undertaken by environmental promotion agencies; to promote the integration of environmental issues in development policies, projects, plans and programmes (due the implication of EIA and SEA); to coordinate implementation of Government policies and decisions taken by the Board of Directors and ensure the integration of environmental issues in national planning among concerned departments and institutions within the Government; to advise the Government with regard to the legislation and other measures relating to environmental management or implementation of conventions, treaties and international agreements relevant to the field of environment as and when necessary; to make proposals to the Government in the field of environmental policies and strategies.

- **Rwanda Land Management and Use Authority (RLMUA):** RLMUA is an authority under the Ministry of Natural Resources that has a mandate of guiding the implementation of Land Policy not only across Government, but also by incorporating the perspective and experience of the private sector, civil society and the academic community. It has also a mandate to put in place an efficient system of land administration and land management that secure land ownership, promote investment in land for socio-economic development and poverty reduction.
- **Rwanda Energy Group (REG):** REG has as mission to create conditions for the provision of sufficient, safe, reliable, efficient, cost-effective and environmentally appropriate energy services to households and to all economic sectors on a sustainable basis. REG has a vision of contributing effectively to the growth of the national economy and thereby improve the standard of living for the entire nation in a sustainable and environmentally sound manner.
- **RDB (Rwanda Development Board):** The Rwanda Development Board is evidence that Rwanda is open for business. It is truly a “one stop shop (Centre) for all investors”. Rwanda Development Board was set up by bringing together all the government agencies responsible for the entire investor experience under one roof. **RDB is responsible for approval of EIA reports by issuing an EIA Certificate.**
- **Rwanda Utilities Regulatory Agency (RURA)**
The RURA energy sector's mission is to establish a framework for the undertaking of electricity activities so as to achieve an efficient effective, sustainable an orderly development and operations of electricity supply in Rwanda. The regulation shall apply to any person carrying out or intending to carry out generation, transmission, distribution and trade of electrical power within or outside the Republic of Rwanda.
- **Provincial, District and Lower level Environmental Committees**
The Rwandan National Environment Policy of 2003 also proposed the establishment of provincial, district and lower level environmental committees beside the establishment of REMA responsible for environmental protection.

Chapter 5. ALTERNATIVES AND OPTIONS OF THE PROJECT

The purpose of this chapter is to examine the possible alternatives for delivering the goals and objectives of the project. For this particular programme, some options have been considered. In seeking the best alternative, the “status quo” or “do nothing” option and the actual on grid electrification were considered and the alternatives analysis show the best alternative for implementation of the project.

5.1 Alternative line routes

An analysis of alternative line routes will be undertaken by the surveying and design team through mapping and involvement of all the stakeholders in this selection process. At the end of this process, the line of routes chosen for this project based on the following:

- i. The line of routes were the most direct compared to going along the road. E.g. From KBC Lines to Christus Lines, this was the most direct compared to the going by the road.
- ii. Also the line of routes chosen required less expropriation and hence less costly than other alternative routes.
- iii. For the 15KV Transmission Line (T/L) route, tapping power from the Rond Point SS- MINECOFIN SS was cheaper and most optimal compared to creating a new line from Christus SS.

5.2 KBC Substation and Christus location

Possible alternatives for the location of the sites for the construction of the KBC substation and Christus were considered. After analysis, the selected sites were retained due to the following reasons:

- i. For KBC Substation- The selected plot is under the possession of REG/ EDCL (the proponent). EDCL possesses the land documents.
- ii. Nyarutarama site was chosen on grounds that it was closest position to the existing power line in Remera sector.

- iii. Minecofin SS site was located at end of the shortest line of Route 1 Distribution line from Gikondo substation.



Photo 4:

5.3 No Project Alternative

A No Project (Do nothing option) alternative would primarily mean that the status quo will be maintained and in a sense the environmental impacts (adverse) will not occur. However the positive benefits will be forgone in terms of providing more access to electricity to the Rwandan population which would have in turn spurred and contributed to economic growth.

If the “do nothing option” was considered, some benefits would be missed out such as:

- Increased electricity supply to KBC substation, Christus substation, Ministere and Nyarugenge Sector areas.
- The Gikondo line supplying KBC cabins Cell would continue to be strained and provide low amount of electricity to an area that is rapidly growing into a mixed use area (i.e.residential and institutions).

During the construction phase there would be no temporary employment opportunities for local contractors,

- There would be no employment or supply services and provisions for workers and to contractors,
- Within the respective project areas there would be no opportunities for petty trading and small business service provision along the power line routes,
- Potential beneficiary enterprises such as small industries and other agricultural processing businesses lacking electricity would still be affected,
- Data management with computers and communication facilities like access to internet, charging of mobile phones; electric lighting at night, extended opportunities for work and study would be evidently missed out,
- Socio-economic development would not be achieved if the project is not implemented,
- Generally, employment opportunities that would be created by the programme would be miss out,

5.4 Comparison of Alternatives

The selected line routes, location of substations were the most feasible in light of the availability of electricity network in the area, the positive environmental benefits, and most importantly because this is what the Kigali City communities prefer. The alternative of “no-build” is not feasible because electricity is included as a measure of development in a village and therefore is always given high priority in the list of developmental activities for any country. While there will be no high environmental cost from these alternatives, with increasing population it is expected that the demand for fuel wood will increase each year, putting very heavy pressure on the already dwindling forest resource.

Chapter 6. NATURE AND EXTENT OF KEY ENVIRONMENTAL AND SOCIAL IMPACTS OF THE PROJECT

The project of construction of 15KV transmission and distribution network in Kigali City is likely to have potential impacts (both positive and negative) on the surrounding and connected communities, both directly and indirectly as there will be direct and indirect interactions between project activities and the environment. This chapter identifies analyses and classifies these impacts that could arise from the activities of the project, either during the construction phase or the operational phase.

The impacts also apply on socioeconomic environment (health, security, economic activities, employment, finances, population; present land use; planned development activities; community structure; distribution of income, goods and services; recreation; public health; cultural properties, etc) and to the biophysical environment (fauna, flora, water, air, soil, landscape).

These impacts were evaluated by assuming when there is no avoidance or mitigation measures are taken. The evaluation based on World Bank environmental and social check lists and are shown in the scoping matrices below:

	No	Item	SCOPING		STUDIES	Evaluation Basis
			Planning /Construction	Operation		
Social	1	Involuntary Resettlement	B-	D	ARAP	1 house and one annex will be probably resettled or compensate.
	2	Poverty	D	D	Socio Economic Study	No presence of households under the poverty.
	3	Indigenous/ Minorities	D	D	Census survey	No presence of indigenous people of the PAPs
	4	Economic activities, living and livelihood	B+/-	A+	Expert observation, Literature review	No impact is expected during planning phase. During construction phase, some adverse impacts are expected due to limited access to use of agricultural lands within project area. Positive impact by an affirmative program of employment of PAPs and other locals. During operational phase, positive impacts are expected towards local economies, growing businesses, due to stable and increased power supply to KBC, Christus and MINECOFIN substation. Increased power to Kigali City shall speed up growth of industries in its phase 2.
	5	Land use & Utilization of local	B-	D	observed from Project design	During planning period, due to the alignment of power lines or locations of Kigali Network, there

	resources			components	may be some changes in land use. During construction period, land in the ROW might not be used by locals. Also the use of water resource in the locality is necessary for construction works. No impact is expected during operation phase.
6	Water Use/Water Right	D	D	Field visit observation and literature review	No impact at all phases. No water bodies with in the area. Most of the project area is an urban area with no direct water supply other than water collection points. The water needed for construction shall be fetched by the contractor.
7	Existing social infrastructure and services	B-	A+	Observed from project line of route.	During planning and construction, the 15 KV transmission lines shall cross an existing power lines close to MINECOFIN substations,the existing infrastructures probably will be damaged during earth excavatio,
8	Cultural Heritage	D	D	Public consultation and literature review	During the site visit and public consultation, there was no existence cultural properties and heritage mentioned nor observed. Hence no impact is expected during the 2 phases of the project.
9	Land scape	D	D	Expert observation.	The towers shall take a small area (i.e. the largest covering 64m ² and the smallest pole 9m ²).The

					excavation of earth for underground cable will have an impact of landscape but there is no significant change in it.
10	Gender	D	D	Literature review on Rwanda gender law	In Rwanda, there is no gender inequality.
11	Children's right	D	D	Literature review on Rwanda labour law	In Rwanda, child labour is prohibited.
12	Infectious Disease (HIV/AIDS)	C-	D	Expert observation	No impact during planning and operation. During construction there is a likelihood that migrant workers, improved income could to an extent contribute to the spread of such sexually infectious diseases.
13	Occupation health hazards	B-	D	Past observation of construction site routine	Accidents during construction. No impact in during planning and operation phase.
14	Human electrocution	D	B-	Past observation of power lines	No impact during planning and construction phase. Children climbing the towers are examples of possible cases of electrocution.
15	Exposure to electro-magnetic fields	D	C-	Reference from Project design, IEC standards and REG/EUCL	No impact during the planning and construction. Exposure to electro-magnetic fields of people living under these power lines could be cancerous in the future.

					assurance letter	
	16	Access roads to sites	D	D	Field visit observation.	No impact at all phases, this being an urban or peri-urban area with easily accessible earth roads plus the sites are close to the road.
	17	Security in the project area	B-	B+	Past observation of similar projects.	No impact in planning phase. During construction, depending on how material is stored, it could encourage theft in the area. During operation, increased power supplied, means adequate lighting hence improved security.
	18	Fire risk	D	B-	Past observation of similar projects.	During operation, electrical circuits could be caused broken conductors, lightning, resulting in fires.
Natural Environment	19	Protected Area	D	D	Field observation and literature review	No protected areas in the project area.
	20	Protected flora species	B-	D	Field observation and literature review	No impact during planning and operation phase. During construction phase, 2 trees shall be cut down locally called "Umuco" or scientifically called <i>Erythrina abyssinica</i> protected under the Rwanda Ministerial order No. 007/2008. Though these trees are abundant in the country, the reason

						for their protection is not that they are rare and endangered but rather for local cultural memory.
	21	Protected Fauna	D	D	Field observation and literature review	Project area is in an urban , with community settlements and agricultural activity. Project activities will have no significant effects on it.
	22	Ecosystem	D	D	Field observation and literature review	Project area is in an urban and peri-urban area, with community settlements and agricultural activity. This has already affected the indigenous ecosystem, whereby project activities will have no significant effects on it.
	23	Hydrology	D	D	Field observation and literature review	No water bodies with in the project area.
	24	Geology	B-	D	Field observation	Land levelling at Gikondo SS
Pollution	25	Air pollution	B-	D	Past experience of construction sites	Dust from excavation works and emissions from heavy machines, automobiles during construction
	26	Water pollution	D	D	Field observation and literature review	No water bodies with in the project area.

27	Soil degradation /pollution	B-	B-	Past observation of similar projects.	Soil erosion from exposing soils during excavation and levelling during construction. Oil spillage from refuelling of equipment or automobiles during construction. Oil spillage at Gikondo SS during refuelling of generators during operation
28	Solid Waste	B-	D	Past observation of similar projects.	Organic waste from food leftovers, metal craps, cardboards, paper littered on site during construction, deconstruction of existing towers.
29	Noise/Vibration	B-	C	Past observation of similar projects.	Excavation works, compaction, vibration activities during construction are sources of noise during construction. Noise to an extent from Minijust SS, Nyarutarama I and Christus during operation.
30	Odour	B-	D	Past observation of similar projects.	Unattended solid waste during construction could cause obnoxious odour from rotting waste.
31	Poor sanitation	B-	D	Past observation of similar projects.	No impact during planning or operation. During construction, lack of toilets on site, existence of unhygienic toilets could be a source of diseases to humans around the sites.

Table 4 :SCOPING MATRIX

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Chapter 7. IMPACTS EVALUATION

Based on the results of impacts assessment, the impacts created by the project were evaluated using an impact evaluation. The evaluation basis of most of the impacts anticipated in the scoping matrix remain the same in the impact matrix except for; Infectious diseases, exposure to electromagnetic fields, bird electrocution, noise and vibration, as shown in the table below.

Table 5: Impact evaluation

	No	Item	Evaluation during Scoping		Evaluation based on Study Result		Evaluation Basis
			Planning /Construction	Operation	Planning /Construction	Operation	
Social	1	Involuntary Resettlement	B-	D	B-	D	1 house will be probably resettled.
	2	Poverty	D	D	D	D	No presence of households under the poverty line.
	3	Indigenous/ Minorities	D	D	D	D	No presence of indigenous people of the PAPs
	4	Economic activities, living and livelihood	B+/-	A+	B+/-	A+	No impact is expected during planning phase. During construction phase, some adverse impacts are expected due to limited access to use of agricultural

							lands within project area. Positive impact by an affirmative program of employment of PAPs and other locals. During operational phase, positive impacts are expected towards local economies, growing businesses, due to stable and increased power supply to Kimihurura, Remera and Nyarugenge sectors and employment. Increased power to Kigali Town shall speed up growth of industries, residential and public institutions.
5	Land use & Utilization of local resources	B-	D	B-	D		During construction period, land in the ROW might not be used by locals. Also the use of water resource in the

							locality is necessary for construction works. KBC SS, Christus and Minecofin SS will no longer the land use purpose they previously had. No impact is expected during operation phase.
6	Water Use/Water Right	D	D	D	D	D	No impact at all phases. No water bodies with in the area. Most of the project area is a peri-urban area with no direct water supply other than water collection points. The water needed for construction shall be fetched by the contractor.
7	Existing social infrastructure and services	B-	A+	B-	A+	A+	During planning and construction, the 15kV transmission lines shall cross an existing power lines

							close to KBC SS, at the upper edge of Kigali Town.
8	Cultural Heritage	D	D	D	D	D	During the site visit and public consultation, there was no existence cultural properties and heritage mentioned nor observed. Hence no impact is expected during the 3 phases of the project.
9	Land scape	D	D	D	D	D	The towers shall take a small area (i.e. the largest covering 64m ² and the smallest pole 9m ²), hence no significant change in land scape.
10	Gender	D	D	D	D	D	In Rwanda, there is no gender inequality.
11	Children's right	D	D	D	D	D	In Rwanda, child labour is prohibited.

12	Infectious Disease (HIV/AIDS)	C-	D	D	D	Construction of towers and laying of power lines is not a complex job to require foreign workers. The sites are within Kigali city and hence the project shall employ people from within the area, no lodging involved hence no significant impact regarding spread of such diseases.
13	Occupation health hazards	B-	D	B-	D	Accidents during construction. No impact in during planning and operation phase.
14	Human electrocution	D	B-	D	B-	No impact during planning and construction phase. Children climbing the towers are examples of possible cases of electrocution.

15	Exposure to electro-magnetic fields	D	C-	D	D	<p>Project design has allowed for minimum vertical clearance from the lowest conductor to top of the structure of 5m to prevent any human activity on top of the roof of building from coming into contact with the conductor. Furthermore, WHO has confirmed after research that there is no evidence that exposure to low levels of EMFs is harmful to human health. Hence no adverse health impact to people along transmission line ROW.</p>
16	Access roads to sites	D	D	D	D	<p>No impact at all phases, this being an urban or peri-urban area with easily accessible earth roads plus the sites are close to the</p>

							road.
	17	Security in the project area	B-	B+	B-	B+	No impact in planning phase. During construction, depending on how material is stored, it could encourage theft in the area. During operation, increased power supplied, means adequate lighting hence improved security.
	18	Fire risk	D	B-	D	B-	During operation, electrical circuits could be caused broken conductors, lightning, resulting in fires.
Natural Environment	19	Protected Area	D	D	D	D	No protected areas in the project area.
	20	Protected flora species	B-	D	B-	D	No protected areas in the project area
	21	Protected Fauna	D	D	D	D	No protected area in the project area
	22	Bird electrocution	D	C-	D	D	No bird migratory path in the project area.

Pollution	23	Ecosystem	D	D	D	D	Project area is in an urban area, with community settlements and agricultural activity. This has already affected the indigenous ecosystem, whereby project activities will have no significant effects on it.
	24	Hydrology	D	D	D	D	No water bodies with in the project area.
	25	Geology	B-	D	D	D	Geology of the area has already been disturbed at the time of preparation of the Gikondo SS
	26	Air pollution	B-	D	B-	D	Dust from excavation works and emissions from heavy machines, automobiles during construction
	27	Water pollution	D	D	D	D	No water bodies with in the project area.

28	Soil degradation/pollution	B-	B-	B-	B-	Soil erosion from exposing soils during excavation and levelling during construction.
29	Solid Waste	B-	D	B-	D	Organic waste from food leftovers, metal craps, cardboards, paper littered on site during construction, deconstruction of existing towers.
30	Noise/Vibration	B-	C	B-	D	Minijust SS, Nyarutarama and Christus will be closed door installations with minimal noise.
31	Odour	B-	D	B-	D	Unattended solid waste during construction could cause obnoxious odour from rotting waste.
32	Poor sanitation	B-	D	B-	D	During construction, lack of toilets on site, existence of unhygienic toilets

							could be a source of diseases to humans around the sites.
--	--	--	--	--	--	--	---

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Chapter 8. ENVIRONMENTAL MANAGEMENT PLAN

Appropriate mitigation measures are suggested that should be adopted by the proponent of the project to minimize the potential significant impacts. The mitigation measures have put special focus on avoiding or reduction of vegetation clearing except on Gikondo dispatching, pollution of soils, water, and air by emissions from construction activities. It has also addressed mitigation measures against impacts that would adversely affect human health and their socio-economic stature of stakeholders. In order to have a more explicit understanding of the correlation between likely adverse impacts and mitigation measures, this information has been presented in the proceeding tables, where each activity has been matched with its likely negative impacts and proposed mitigation measures, the responsible during implementation and the cost involved.

No.	Item	Mitigation Measures	Responsibility	Cost (USD)
Planning phase				
1	Involuntary Resettlement	Compensation based on Asset inventory and valuation in the ARAP.	Sectors authorities, REG/ EUCL	N/A
Construction phase				
1	Land use & Utilization of local resources	Clear work schedule of project construction phasing and speeding of construction works	Contractor	N/A
2	Existing social infrastructure and services	Design has considered re-routing of this existing line through route 3 of the project components	REG/EUCL, and Contractor	N/A
3	Occupation health hazards	Prepare and implement a site Health and safety plan that includes measures to: 1-Exclude the public from all constructions sites; 2-Ensure that workers use personal protection equipment; 3-Provide Health & Safety training for all personnel; 4-Follow documented procedures for all site activities; 5-Keep accident reports and records; 6-Inform local communities about the work and dangers	Contractor, EUCL engineers	N/A

4	Security in the project area	Hoarding of construction sites with wire mesh fencing, lighting of construction site at night and hiring of security guards	Contractor	Cost inclusive in construction contract
6	Air pollution	1-Minimize number of deliveries through timely scheduling. 2-Only contract automobiles with vehicle inspection certification, which are expected to have less exhaust emissions.	Contractor	N/A
7	Soil degradation/pollution	1- Soil compaction of completed portions. 2- Proper storm water drainage channels to avoid run-off from carrying away soils. 3-Plant grass at completed areas (Around substations). 4- As for oil spillage prevention, re-fueling shall be done on cemented grounds with sand to absorb the spilled oil.	Contractor	Cost inclusive in construction contract
8	Solid Waste	1- Regular disposal of solid waste to Nduba damp site or have a contract with a RURA registered waste disposal company to dispose it off.	Contractor	Cost inclusive in construction contract
9	Noise/Vibration	1- Noise activities during working hours 7-17h. 2-Contractor shall use automobiles with Inspection certificates since they are in good condition emitting less noise.	Contractor	14USD/ Vehicle for Inspection
10	Odour	1- Regular disposal of solid waste to Nduba damp site or have a contract with a RURA registered waste disposal company to dispose it off.	Contractor	Cost inclusive in construction contract

11	Poor sanitation	1- Mobile toilets installed on site with a person in-charge of ensuring proper hygiene of these toilets.	Contractor	Cost inclusive in construction contract
Operation phase				
1	Human electrocution	<p>1-To avoid towers from being conductors capable of electrocuting people that touch them, horizontal insulators are used to connect the two conductors attached to the tower.</p> <p>2-Also panels shall be placed on the towers with instructions in Kinyarwanda, English or French informing people of the dangers of getting close, touch or climbing the tower.</p> <p>4-Towers are also designed to have a ground wire that provides a more direct current path to the earth for lightning to flow through than the transmission lines, hence avoiding lightning from striking the transmission lines and causing fires or electrocution.</p> <p>5-Train and supervise EUCL operatives to ensure that they check house wiring carefully and reject if deficient.</p> <p>6-Public education to raise villagers' awareness of dangers of electricity and how to utilize the system safely</p>	Contractor, EUCL engineers	Cost part of the construction contract

2	Soil degradation/pollution	For oil spillage prevention, re-fueling shall be done on cemented grounds with sand to absorb the spilled oil.	EUCL	N/A
3	Fire risk	Towers shall be designed to have a ground wire that provides a more direct current path to the earth for lightning to flow through than the transmission lines, hence avoiding lightning from striking the transmission lines and causing fires or electrocution.	Contractor	Cost inclusive in construction contract

Table 6: Environmental Management Plan

Chapter 9. MONITORING PLAN

A detailed environmental monitoring plan has been developed to verify that predictions of environmental impacts are accurate and that unforeseen impacts are detected at an early stage and allow corrective measures to be implemented, if needed.

During the construction phase, the plan provides for soil erosion, vegetation clearing, dust, noise, visual impacts, service disruption and safety monitoring.

During the operation period, monitoring is planned in terms of routine inspection of the health and safety of the workers, disruption impacts during maintenance of ROW, fire hazards, and electrocution. The Monitoring Plan is developed is presented at the end of this report as part of the EIA.

Environmental monitoring is an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measures, as they are required. It helps to anticipate possible environmental hazards and/or detect unpredicted impacts over time. Monitoring includes:

- Visual observations;
- Selection of environmental parameters at specific locations;
- Sampling and regular testing of these parameters.

Monitoring should be undertaken at a number of levels. Firstly, it should be undertaken by the contractor at work sites during construction, under the direction and guidance of the supervising engineer who is responsible for reporting the monitoring to the implementing agencies, EUCL and donor counterpart World Bank.

EUCL should in turn undertake independent monitoring of selected parameters to verify the results of the contractor and to audit direct implementation of environmental mitigation measures contained in the EMP and construction contract clauses for the Project. EUCL also will have the direct responsibility to implement and monitor land

acquisition and compensation issues as outlined in the ARAP. Their Project teams should include an environmental monitoring and management specialist as well as a sociologist experienced in land acquisition and compensation issues.

RDB has the overall responsibility for issuing approval for the Project and ensuring that their environmental guidelines are followed during Project planning and implementation. Their role therefore is to review environmental monitoring and environmental compliance documentation submitted by the implementing authorities and they would not normally be directly involved in monitoring the Project unless some specific major environmental issue arose.

Environmental monitoring of the following parameters is recommended as a minimum for EUCL project of 15KV transmission and distribution network in Kigali City.

Noise Levels Monitoring

Although noise during construction is not expected to be a problem with the Project, periodic sampling of Contractor equipment and at work sites should be undertaken to confirm that it is not an issue. Noise level monitoring could be supplemented by consulting with Project Affected People in the first instance to identify the level of monitoring required.

Soil Erosion Monitoring

The excavation of earth for the establishment of towers, temporary and permanent access roads, , storage facilities and substations will exacerbate soil erosion. It will, therefore, be the responsibility of the Contractor's environmental inspectors to ensure the implementation and effectiveness of erosion control measures. Focus should be given to work sites where soil is disturbed and its immediate environ as well as along the ROW during and after vegetation clearing.

Monitoring of Vegetation Clearing

Unique stands of indigenous trees should not be removed for the establishment of towers. The Contractor's environmental inspectors should make sure that the unique tree stands should not be removed.

Monitoring Rehabilitation of Work Sites

The Contractor's environmental inspectors should ensure that areas used as temporary campsites for workers are progressively rehabilitated as they are no longer required. Once a site is rehabilitated it should be "signed off" by EUCL environmental staff.

Monitoring of Accidents/Health

The Contractor's environmental inspectors must make sure that appropriate signs are posted at appropriate locations/positions to minimise/eliminate risk of electrocutions. In addition the environmental inspectors should make sure that:

- EUCL will have overall responsibility to oversee that all environmental measures are put in place and that regulations are enforced. The construction supervision consultant should assist EUCL in this process in order to make sure that contractors fulfil the environmental requirements.

The following parameters could be used as indicators:

- Presence of posted visible signs on towers to prevent electrocution;
- Level of awareness of communities pertaining to dangers/risks associated with power lines;
- Presence/absence of unique stands of indigenous trees along the power line establishment route; and
- Accident reports. Records on actual accidents associated with the establishment of the transmission line could be compiled with the help of local peasant association officials, teachers/students of local schools.

Responsibilities and Costs for Environmental Mitigation Measures

The table below outlines the overall package of environmental monitoring measures that will be implemented in relation to the facility as outlined in detail in the EMP document.

The table also assigns general responsibilities for implementing each group of mitigation measures.

These costs are therefore described as 'Within contract budget' in table below. Similarly, mitigation or monitoring measures that will be carried out by EUCL staff, with no additional expenditure required, are described as 'Within operational budget' in the table below.

Table 7: ENVIRONMENTAL MANAGEMENT PLAN

No	Item	Mitigation Measures	Parameters to be monitored	Method	Frequency	Responsibility	Cost (USD)
Planning phase							
1	Involuntary Resettlement	Compensation based on Asset inventory and valuation in the ARAP.	Cash transfer via bank accounts	EUCL Order of Payment to each PAP	In accordance with the monitoring plan in ARAP but preferably monthly.	EUCL	No cost applicable for monitoring since its within the EUCL operation budget.
Construction phase							
1	Land use & Utilization of local resources	Clear work schedule of project construction phasing and speeding of construction works	Construction Duration	Work schedule	Before construction commencement and quarterly during construction phase	Contractor/EUCL	No cost applicable for monitoring since its within the EUCL operation budget.
2	Existing social infrastructure and services	Design has considered re-routing of this existing line through routes of the project	Existing line re-routed	Inclusive in Project design	During construction of Routes	Contractor/EUCL	

		components					
3	Occupational health hazards	Prepare and implement a site Health and safety plan that includes measures to: 1-Exclude the public from all constructions sites; 2-Ensure that workers use personal protection equipment; 3-Provide Health & Safety training for all personnel; 4-Follow documented procedures for all site activities; 5-Keep accident reports and records; 6-Inform local communities about the work and dangers	Workers with protective gear, Eyes mask, records of accidents	Site inspection	Monthly	Contractor/EUCL	No cost applicable for monitoring since its within the contractor

4	Security in the project area	Hoarding of construction sites with wire mesh fencing, lighting of construction site at night and hiring of security guards	Hoarding fence, light and security guards	Site inspection	Throughout the construction phase	Contractor	N/A
6	Air pollution	1-Minimize number of deliveries through timely scheduling. 2-Only contract automobiles with vehicle inspection certification, which are expected to have less exhaust emissions.	Automobiles with inspection certificates	Site inspection	Throughout the construction phase	Contractor	No cost applicable for monitoring since it's within the contractor
8	Solid Waste	1- Regular disposal of solid waste to Nduba dump site or have a contract with a RURA registered waste disposal	Solid waste on site	Site inspection	Throughout the construction phase	Contractor	No cost applicable for monitoring since it's within the contractor.

		company to dispose it off.					
9	Noise/Vibration	1- Noise activities during working hours 7-17h. 2-Contractor shall use automobiles with Inspection certificates since they are in good condition emitting less noise.	Automobiles with inspection certificates	Site inspection	Throughout the construction phase	Contractor	No cost applicable for monitoring since its within the Sectors' operation budget.
10	Odour	1- Regular disposal of solid waste to Ndubia damp site or have a contract with a RURA registered waste disposal company to dispose it off.	Solid waste on site	Site inspection	Throughout the construction phase	Contractor/ Sector infrastructure department	No cost applicable for monitoring since its within the Sectors' operation budget.
11	Poor sanitation	1- Mobile toilets installed on site with a person in-charge of ensuring proper hygiene of these	Clean mobile toilets on site	Site inspection	Throughout the construction phase	EDCL/ Sector infrastructure department	No cost applicable for monitoring since it's within the Contractor

		toilets.						
Operation phase								
1	Human electrocution	1-To avoid towers from being conductors capable of electrocuting people that touch them, horizontal insulators are used to connect the two conductors attached to the tower. 2-Also panels shall be placed on the towers with instructions in Kinyarwanda, English or French informing people of the dangers of getting close, touch or climbing the	Towers with proposed mitigation precautions y measures installed	Site inspection	At commissioning of the construction completion	EUCL/ Sector infrastructure department	No cost applicable for monitoring since its within the EUCL/ Sectors' operation budget.	

		<p>tower.</p> <p>3-Towers are also designed to have a ground wire that provides a more direct current path to the earth for lightning to flow through than the transmission lines, hence avoiding lightning from striking the transmission lines and causing fires or electrocution.</p> <p>4-Train and supervise EUCL operatives to ensure that they check house wiring carefully and reject if deficient. 6- Public education</p>					
--	--	---	--	--	--	--	--

		to raise villagers' awareness of dangers of electricity and how to utilize the system safely					
3	Fire risk	Towers shall be designed to have a ground wire that provides a more direct current path to the earth for lightning to flow through than the transmission lines, hence avoiding lightning from striking the transmission lines and causing fires or electrocution.	Towers with proposed mitigation precautionary measures installed	Site inspection	At construction completion. Also inspection throughout operation as part of Operation and Maintenance.	EUCL/ Sector infrastructure department	No cost applicable for monitoring since its within the EUCL/ Sectors' operation budget.

Chapter 10. STAKEHOLDERS CONSULTATION AND PUBLIC PARTICIPATION

Reference made to methodology applied in identification of stakeholders and their concerns, the study was able to conduct public consultation of the three (3) categories of stakeholders.

- *First category* of Design team, EUCL study team and Government officials were met, which included; REG (EDCL and EUCL). By using the key guiding questionnaires based on requirements of the “World Bank Environmental and Social Consideration-Key Points on EIA report and Resettlement Action Plan”, we were able to guide discussions and obtained relevant information on project activities.
- The *Second category* met was of Local government officials, which included; Executive secretaries and infrastructure officers for the Gasabo District sectors of project intervention: Remera, Gikondo, Kimihurura and Nyarugenge. Our discussions with them were again guided by the guiding questionnaires, from which information on project objectives, components, benefits, constraints in

implementing the project and impacts likely to be caused by the project were reflected.

- The *Third category* was of locals of the project area (i.e. residents, farmers, business people, civil servants etc.) who are either benefiting from the project or affected by it. These too were guided by the guiding questionnaires, from which information on project benefits and adverse impacts were aired out. A census survey form was applied in public consultation of the Project Affected People (PAPs) to determine their accurate socio-economic data. i.e. number of Female- male Headed Households (HH), how many they were in HH, what of their property would be expropriated, whether any of heads of HH were classified under vulnerable groups.

Issues from local government officials- (i) Whether the power would serve their Sectors and Cells or it was just traversing. (ii) Adequate compensation of PAPs in their areas and in time. (iii) When works would commence for them to indicate it their action plans. (iv) whether an affirmative action would be applied in employment of workers at time of construction.

Issues from locals-(i) Adequate compensation for lost property in good time before construction work commence, (ii) Whether they would get jobs from the construction works. (iii) Whether the power would serve their Sectors and Cells or it was just traversing.

Issues raised and responses addressing them during the stake holder engagement process were compiled and summarised in the *table* below and have been considered in chapters for impact assessment and incorporated in the Environmental impact and management plan.

Table 8: Summary of issues raised during Public consultation

Issues at hand	Stake holders	Response to issues at hand
Compensation for lost property.	PAPs	Accurate valuation of land, crops and homes for compensation will be guided by an Abbreviated

		Resettlement Action Plan (ARAP) and full replacement compensation.
Job opportunities during construction phase.	Locals of the project area	An affirmative program that gives locals/ PAPs in the area, employment priority during construction.
Questioning whether the power lines would serve their communities	Local authorities and locals	The purpose of the power lines was to increase the amount of power in the Sectors of Remera, Kimihurura, Gikondo and Nyarugenge.

Chapter 11. CONCLUSION AND RECOMMENDATIONS

11.1 Conclusion

The Field Visit and the Project Scoping has identified a number of issues pertaining to the proposed Kigali 15 KV Network Strengthening project. The issues/impacts have been assessed and described in some detail to gain an adequate understanding of possible environmental effects of the proposed project – from design to operation, in order to formulate mitigation measures in response to negative aspects which have emerged. The Environmental Management Plan (EMP) provides a way forward for implementation of the identified mitigation measures. The EMP should be implemented as a prerequisite for a positive decision by the appropriate authorities.

The estimated costs of implementing the mitigation measures are just indicative. Appropriate bills of quantities by the contractors should clearly give the actual figures. In any case the EUCL team has used informed judgement to come up with these figures.

The Environmental Monitoring Plan provides parameters to be monitored and responsibility. This way the Proponent will achieve sustainable project implementation at reduced cost for undertaking the monitoring. However, regular internal monitoring shall

be carried out by the project proponent in order to ensure if the EMP is implemented regarding the law.

Given the nature and location of the project development, the conclusion is that the potential impacts associated with the proposed project of substation construction of 15KV transmission and distribution network in Kigali City are of a nature and extent that can be reduced, limited and eliminated by the implementation of appropriate mitigation measures.

11.2 Recommendations

Based on the findings of this ESIA study, the proposed recommendations are:

- 1) Full replacement compensation of expropriated property based on Asset inventory and valuation in the ARAP. However they will be no more population displacement in Kigali City maybe one or two households.
- 2) Clear work schedule of project construction phasing and speeding of construction works to reduce on the time soil is left exposed.
- 3) Design shall considered re-routing of this existing line through route of the project components.
- 4) For the safety of workers, a health safety plan shall be implementing on site.
- 5) Hoarding of sites with wire mesh fencing, lighting and security guards to avoid insecurity in the form of theft especially at upgrade substations (CABINS).
- 6) Delivery trucks will be restricted to late morning and afternoon hours to reduce on the noise pollution and traffic congestion in the area. Furthermore, for noise pollution, noise emitting activities shall be subjected to the working hours (7-17h) when residents are away at work to avoid noise nuisance.
- 7) For solid waste management, regular waste disposal to Nduba Dump site or hiring out a waste disposal company with a RURA registered garbage collecting company shall be entered into by the contractor.
- 8) To avoid human electrocution at towers, panels informing people of the dangers of climbing towers shall be placed at time of construction. Sharp spokes at the lower

horizontal members of the towers to prevent people from climbing towers shall also be included in the construction of towers.

- 9) To avoid fires from lightning, a ground wire on the tower is necessary to avoid lightning from striking the tower and causing electric circuits that could be a hazard to the neighbourhood.
- 10) A fire management plan is proposed that includes installation of fire extinguishers in the Cabins. But actually, the fire extinguishers are not in place.
- 11) It is recommended that a regular monitoring field visit and reporting is carried out by EDCL/EUCL environmental and social safeguards specialists quarterly.
- 12) To ensure compliance with national laws and REMA guidelines an environmental audit should be carried out at the end of Construction phase and during the operation phase.

12. REFERENCES

1. EARP (2015): Environmental and Social Management Framework Review. Rwanda.
2. EARP (2015): Resettlement Policy Framework Kigali Review. Rwanda.
3. EARP (2015): Environmental Audit of EARP Subprojects, Rwanda.
4. EARP (2014) Strategic Environmental and Social Assessment(SEA). Rwanda.
5. GoR (2003). Rwanda Vision 2020. Kigali, Rwanda.
6. GoR (2015). Constitution of the Government of the Republic of Rwanda. Rwanda
7. GoR (2005). Organic Law No. 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of the environment in Rwanda. Rwanda
8. GoR (2006). Law No. 16/2006 of 03/03/2006 determining the organization, functioning and responsibilities of the Rwanda Environmental Management Authority (REMA). Rwanda.
9. GoR (2008). Economic Development & Poverty Reduction Strategy. Rwanda.
10. MINECOFIN (2007). Economic Development & Poverty Reduction Strategy 2008 – 2012. Rwanda
11. MININFRA (2008a) Biomass Strategic Workshop, 30th April 2008. Ministry of Infrastructure (MININFRA), Kigali.
12. MININFRA (2004) Rwanda Energy Policy. Rwanda
13. MINIRENA (2009). *Joint Sector Review*. Ministry of Natural Resources (MINIRENA), Kigali.
14. MINITERE (2003a). *National Strategy and Action Plan for the Conservation of Biodiversity in Rwanda*.

15. REMA (2006). *Economic Analysis of Natural Resource Management in Rwanda*. Rwanda Environment Management Authority (REMA), Kigali.
16. REMA (2009). Rwanda State of Environment and outlook. Rwanda
17. World Bank OP/BP 4. 01 Environmental Assessment
18. World Bank OP/BP 4. 04 Natural Habitat
19. World Bank OP/BP 4. 11 Physical Cultural Resources

13. APPENDICES

13.1 List of Consulted People

13.2 Terms of references for EIA provided by RDB