

**RWANDA ENERGY GROUP**

**ENERGY UTILITY CORPORATION LIMITED (EUCL)**

**ELECTRICITY ACCESS ROLL-OUT PROGRAMME (EARP)**

**RWANDA ELECTRICITY SECTOR STRENGTHENING PROJECT (RESSP)**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT OF  
CONSTRUCTION OF TRANSMISSION AND DISTRIBUTION NETWORK AND  
SUBSTATION IN EASTERN PROVINCE OF RWANDA.**

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## **EXECUTIVE SUMMARY**

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The Government of Rwanda (GoR) through the Ministry of Infrastructure (MININFRA) has proposed for funding under World Bank, the Rwanda Electricity Sector Strengthening project (RESSP). The Project will allow the Government of Rwanda to achieve and expand upon result from Electricity Access Rollout Programme EARP which continues to construct the backbone of the power supply system to rural areas and will align generation capacity and demand to achieve an efficient tariff. EARP is being implemented within the framework of a Sector Wide Approach (SWAP) to encompass all donors active in the sector under one common sector investment program.

The aimed of RESSP is to increase Access to Electricity and to Strength Capacity in Electricity Sector with an aim to improve the performance of the electricity sector institution. The project will finance also activities of construction of substation, transmission and distribution electricity network in 4 provinces of Rwanda and KIGALI 15kv distribution network upgrade.

However, those activities will have adverse impact (both positive and negative) on environment and connected communities. Before project implementation, it will be necessary getting an environmental clearance given by RDB according the environmental law. And to get, this Clearance, each developer must prepare and elaborate the Environmental and Social Impact Assessment (ESIA) report and submitted to this institution.

In Rwanda, legislative and policy framework for environmental assessment are clearly highlighted the most of the laws, policies and guidelines such as: Constitution of the Republic of Rwanda, Rwanda Vision 2020, and National Environmental Policy. National Environmental Law, Environmental Impact Assessment Regulations, Ministerial order N° 003/2008 of 15/08/2008 relating to the requirements and procedure for Environmental Impact Assessment, General guidelines and Procedures for SEA of 2010, National Policy on EIA, Energy Policy, Land Policy.

In addition, Rwanda is a signatory country of many international and regional convention and treaties related to the environmental protection and legislative environmental guidelines and most important the World Bank operation policies since it are the major funding agency of EARP activities (ESMF-EUCL, 2015)

From the environmental point of view, there is actually growing concern in Rwanda that in the execution phase, many kinds of development projects may cause damage to the environment in general and on human population in particular. The Article 69 of the Organic Law N° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda stipulates that every development project shall be required to undergo Environmental and Social Impact Assessment (ESIA) prior to its commencement.

Before, starting the project implementation, EDCL/EARP proceed to assess the Impact, province by province. However, they started by implementing the subprojects in Eastern Province particularly in respective Districts: *Rwamagana District in Fumbwe and Musha Sectors, Gatsibo District in Remera, Muhura, Kiramuruzi, Kiziguro and Murambi Sectors. Kayonza District in Gahini, Mukarange, Mwiri and Nyamirama District, Ngoma District in Remera and Kibungo Sectors.*

The present study will highlight on the potentials environmental and social impacts of the subprojects in this area, and will facilitate to identify corresponding mitigations measures that will be put in place for avoiding, reducing, minimizing or compensating potentials adverse impacts likely to arise in the cause of project implementation.

## ACRONYMS

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ADB	African Development Ban
BP	Bank Policies
CAS	Country Assistance Strategy
CFL	Compact Fluorescent Lamp
CSP	Country Strategy Paper
DDP	District Development Plan
EA	Environmental Assessment
EAC	East African Community
EARP	Electricity Access Roll out Programme
EDPRS	Economic Development and Poverty Reduction Strategy
EIA	Environmental Impact Assessment
EPC	Engineering Procurement Construction
ESA	Environmental Security Assessment
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
EWSA	Energy Water and Sanitation
FDG	Focus Discussion Group
GEF	Global Environment Facility
GDP	Growth Domestic Product
GoR	Government of Rwanda

HH	Households
IDA	International Development Agency
IMCE	Integrated Management of Critical Ecosystem
IWRM	Integrated Water Resources Management
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
NAFA	National Agro Forestry Authority
NEPAD	New Partnership for Africa's Development
OFID	OPEC Funds for International Development
OP	Operational Facility
PPE	Personal Protective Equipment
PPP	Policy, Plan, or Program
PRSP	Poverty Reduction Strategy Plan
RAP	Resettlement Action Plan
REMA	Rwanda Environment Management Authority
RESSP	Rwanda Electricity Sector Strengthening Project

RPF	Resettlement Plan Framework
SEA	Strategic Environmental Assessment
SWAP	Sector Wide Approach
UNCBD	UN Convention on Biological ++Diversity
UNCCD	UN Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
WHO	World Health Organization

## GLOSSARY OF TERMS

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**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 (FESS 2009).

**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. (Adapted from Partidário 2009)

**Plan:** Priority, option, or measure for resource allocation according to resource suitability and availability, following the orientation of and implementing relevant sectorial and global policies (Adapted from Partidário 2009).

**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 (Adapted from Partidário 2009).

**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 (Adapted from Partidário 2009).

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

**Screening:** A process of determining whether SEA is required for a specific PPP.

**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 (Adapted from Maler and Munasinghe 1996).

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

**Strategic Environmental Assessment (SEA):** “A systematic, on-going process for evaluating at the earliest stage, the environmental quality and consequences of alternative visions and development intentions incorporated in Policy, Planning or Programme initiatives to ensure full integration of relevant biophysical, economic, social and political considerations(EAC 2005).

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## **CHAP I: INTRODUCTION**

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The Government of Rwanda (GoR) through the Ministry of Infrastructure initiated through Rwanda Energy Group (REG) and its subsidiary the Energy Utility Corporation Limited (EUCL), the Electricity Sector Strengthening Project which will contribute to Economic Development and Poverty Reduction Strategy (EDPRS) I and II targets and shall be supported from different donors include World Bank as the main donor. This project complements the on-going EARP which will continue to lead on grid electrification in urban areas and rural settlement.

The project objective is to improve reliable on-grid electricity services for households and priority public's institutions in Eastern Province. The specific objective is also construction of substations, transmission of electrical lines and distribution network in this zone.

In compliance with Organic Law on environmental protection (No. 04/2005 of 8/04/2005) requires development projects, activities, and programs that may affect the environment to undergo Environmental Impact Assessment, applicable World Bank Safeguards Policies especially OP 4.01 Environment Assessment, OP 4.04 Natural habitat and OP 4.12 Involuntary Resettlement. REMA is charged with the coordination, regulation, and oversight of the Environmental Impact Assessment process.

The aim of ESIA preparation to determine and assess future potential environment and social impacts of RESSP, and thus set out mitigation, monitoring and institutional measures to be taken during implementation and operations of the proposed investments/activities and to eliminate their adverse environmental and social impacts offset them, or reduce them to acceptable levels.

Rwanda Development Board is responsible for the screening, review and clearance of planned investment subprojects prior to implementation. The use of ESIA tool by EUCL would be the instrument, through which the RESSP subproject environmental and social impacts are identified, assessed, evaluated and have appropriate mitigation, management and monitoring measures, designed and incorporated within the subproject itself. The World Bank assess if the latter have been complied with its safeguard requirements.

## **I.2. OBJECTIVES OF THE ESIA STUDY**

The objective of the study is to assist EUCL to develop an Environmental and Socio Impact Assessment (ESIA) and Environmental Management Plan (EMP) to ensure that the project is implemented in an environmentally and socially sustainable manner and in full compliance with Rwanda's and World Bank's environmental and social policies and regulations

Specific study objectives were as follows:

Analyse the initial state and describe the baseline environmental issues of the areas which will be covered by the project;

Identify and characterize the negative and positive potential impacts that could arise as a result of the proposed project's activities implementation;

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.

## **I.3. SCOPE OF THE PRESENT STUDY**

Scoping was carried out countrywide and sampling priorities District on which the project will be implemented. Again, the process was to identify the significant issues which should be addressed by the particular Environmental and Social Impact Assessment which is ongoing.

### ***I.3.1. The Scope and the Baseline Study of the Study broadly include:***

- Literature review to collect data relevant to the study area and planned project's activities;
- Environmental and social analysis so as to establish the baseline environmental status of the covered study area;
- Prediction of the potential negative and positive impacts generated by the transmission lines' implementation on the various environmental attributes in the study area;

- Preparation of an Environmental and Social Management Plan (ESMP) outlining the proposed mitigation measures for improving the environmental quality and responsibilities for their application;

### ***1.3.2. Approaches and Methodology***

In general, the ESIA study team started with the reviewing of all existing baseline information and environment data on the proposed project, including project documents available in REG-EUCL. Information available on other similar institutions or related projects undertaken within the project area (PDD des Districts KAYONZA,GATSIBO,RWAMAGANA and NGOMA )was also looked at, review of the relevant Policies, different policies and regulations of the Government of Rwanda, World Bank Policies and guidelines.

### ***1.3.3. Scoping***

Upon reviewing the existing information on this project, scoping was done to identify the size and boundaries of the project, key stakeholders, PAPs, local beneficiaries of the project or have interest in the development of this project. Scoping also directed the study to the area of interest identifies and predict the likely impact areas and entailed an appropriate assessment of the baseline data obtained on the ground.

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).

### ***1.3.4. Field visits***

Visits were made to the project site to assess the socio-physical environment of the proposed project, identify and predict the likely impacts (direct and indirect impacts) and try to propose in advance some appropriate mitigation measures. In addition, the field visits were used to identify the stakeholders especially those who are involved in the project, those who would benefit or be affected by the project. Meetings with key stakeholders who will be involved in the future subprojects.

### ***1.3.5. Interviews***

Interviews were conducted mainly with different stakeholders (EUCL staffs, manpower, engineers, Branch managers who are living in the surrounding project sites), local residents, PAPs, Sector and Cell officials among others. Interviews were structures or semi-structures.

### ***1.4. IDENTIFICATION OF SIGNIFICANT IMPACTS***

After collecting the baseline data from the site visits and interviews with key stake holders, Scoping matrices were prepared that assessed impacts of activities under planning, construction, operation, commissioning phases. These impacts were measures on their significance based on whether the impact is expected or not, to some extent or unknown, reversible or irreversible. Those impact activities identified on the groups will serve as samples on proposing mitigation measures and eventually setting out the environmental management plan (EMP).

### ***1.5. PROJECT DESCRIPTION***

Rwanda Electricity Sector Strengthening Project (RESSP) has been designed to address two major challenges faced by the energy sector in Rwanda:

- i. Electricity Sector Capacity Strengthening with an aim to improve the performance of the electricity sector institutions;
- ii. Increased Access to Electricity.

### ***1.6. PROJECT COMPONENT***

The programme has three components as following:

- Component A (Electricity Sector Capacity Strengthening) which has three subcomponents
  1. Integrated Business Management Information System
  2. Revenue protection
  3. Strengthening technical management capacity of key function in the Electricity Utilities Corporation Limited (EUCL).

- **Components B (Increased Access to Electricity Services) which contains**
  1. Strengthening the Distribution network around Kigali Area
  2. Grid Extension to New Load Centres.
  
- **Components C (Technical Assistance and Project Implementation Support)**
  1. Technical Assistance and Project Implementation Support
  2. Project Implementation Support

### ***1.7. PROJECT ACTIVITIES***

The project is expected to be implemented in Eastern Province particularly in Rwamagana, Gatsibo, Kayonza and Ngoma Districts. During the project implementation, the activities will be divided into 4 phases Design and Planning phase, Construction Phase, Post Construction Phase (Operation) and Decommissioning Phase.

During Design and Planning Phase, it will be a process of survey and mapping for new transmission and distribution routes, stations and substation, sites selection, site selection in order of avoiding sensitive ecosystems. There is no land acquisition for MV and LV lines; only, it will be a compensation process for the crops and trees damage.

During Construction phase, it will be a process of clearing of path where the transmission and distribution infrastructure will pass as the initial activity that will occur during the construction phase. This is done in order to create the vertical and the horizontal clearance required when constructing electricity transmission lines.

There is also provision of Sites Access on which consisting of the provision and maintenance of all access from the main ways to the transmission and distribution line routes during erection and construction of stations and substations as required. Access road shall be constructed in such way that they can be used for maintenance of the line by four wheel drive vehicles up to a total weight of 7.5 tons. The length of the access road is the distance between the edges of public roads to the tower, station or substations location.

The activity of clearing the right-of-way consist on fell any vegetation and dispose of waste material along the entire length of transmission lines. The transmission line right-of-way is 15 meters wide for the 30kv lines symmetrical about the centreline.

Excavation Work and erection of poles consisted on creating the foundations for erecting poles. The general outlines of the poles may be varied but the general dimensions, phase spacing, clearances and the configuration of the conductors and earth wire must be approved.

MV/LV mini substations or cabins shall be installed in different sites along the transmission path. These mini substations will play the role of stepping down the electricity from MV to LV before distributing to consumers. These substations are basically small housing units made of concrete and fitted with transformers and electrical gadgets.

During operation phase, it will be operation and maintenance of the transformers, circuit breakers, circuit's switches and capacitors that will have been installed during the construction phase. Stations and substations maintenance process will be required for the station and mini substations. EUCL/EARP will no longer use transformers containing PCBs (as commonly used in old equipment) which are toxic to the environment and humans.

During the Decommissioning phase, it will be a dismantling and removing all the structures from mini substations sites, dismantling the supporting infrastructures and all those structures that where associated with the project implementation. The program also will rehabilitate the site to its former status or near what it was before the project was commissioned.

**This electrification project will involve the following technical works:**

Construction of aerial MV electrical lines (150Km) in:

- Three phase that can be transformable for future industrial zones
- Three phase for remote and inextensible zones
- Three-phase for reinforcement of already electrified three-phase zones
- Simple mono-phase for the rest of settlements

### **Installation of aerial LV electrical line in:**

- Three-phase of the range of 10,25 and 50 KVA;
- Mono-phase made of triplex (8 transformers mono-phase)

### **Construction of aerial LV transmission lines in:**

- Twist cable mono-phase
- Twist cable three-phase

### **Connection LV of 10.446 households with:**

- Installation of 10.446 prepaid meters/computers
- Installation of lighting boards

## **I.8. LINE CONFIGURATION**

The 30 KV single circuit lines shall be constructed as follows:

Line length : Approximately 1636.9 km

Line Configuration: Single Circuit, triangular configuration

Cable, Conductors and Accessories 88/G/2015-ICB/EARP

Transformers and Accessories 70KN and 40 KN 87/G/2015-ICB/EARP

Types of Poles: Wooden Poles Concrete poles and

Types of conductors and cable (3phases ACSR conductor).

Switchgear CBS in 3 phases (6mm<sup>2</sup>)

Insulator Fuse cut-outs and MV surge arrestors

Accessories 88/G/2015-ICB/EARP

Foundations: Compact soil (wooden pole), soil + cement(steel)

Prepaid meter Single phase

**Table 1: Summary of connections under the project**

	<b>SUM MV LINES (km)</b>	<b>SUM LV LINES(km)</b>	<b>SUM TRANSFOR MERS</b>	<b>SUM MV SWITCH GR</b>	<b>POTENTIAL CONN'S</b>	<b>COST(USD)</b>
<b>Lot 4</b>	75.84	120.30	59	4	6,566	4,876,859
MV_LV1	13.95	23.65	8	0	1,489	1,014,178
MV_LV 3	25.00	37.15	22	1	1,312	1,344,350
MV_LV 4	46.31	64.84	35	2	2,694	2,415,677
MV_LV 12	14.14	22.47	12	0	576	782,727

Source: Project Brief

In Eastern Province, EDCL/EARP planned to connect almost 10,446 households which have been identified at the sites. Most of households are grouped at the centres' located in rural areas of Province.

## **CHAP II: POLICY, LEGAL, INSTITUTIONAL AND ADMINISTRATIVE FRAMEWORK**

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### **II.1 LEGISLATIVE AND POLICY FRAMEWORK FOR ENVIRONMENTAL ASSESSMENT IN RWANDA**

#### ***II.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 date, article 49 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.

#### ***II.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.

#### ***II.1.3. National Environmental Policy (NEP)***

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.

#### ***II.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.

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.

### ***II.1.5. 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.

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.

### ***II.1.6. General Guidelines and Procedures for SEA, 2010***

Organic Law on environmental protection (No. 04/2005 of 8/04/2005) requires development projects, activities, and programs that may affect the environment to undergo environmental impact assessment. REMA is charged with the coordination, regulation, and oversight of the environmental impact assessment process. Rwanda Environment Management Authority (REMA), in coordination with the Ministry of the East Africa Community (MINEAC), is developing guidelines for Strategic Environmental Assessment (SEA) to complement the existing Environmental Impact Assessment (EIA) guidelines for Rwanda. The goal is to expand the application of environmental assessment principles and practices to the formulation and implementation of development policies, plans, and programs (PPPs). These policies, plans, and programs (The case of Electricity Access Rollout Programme - EARP) involve actions to promote economic development and poverty reduction that potentially will have significant effects on the environment.

## **II.2. RELEVANT POLICIES.**

### ***II.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.

### ***II.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.

### ***II.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).

#### ***II.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.

#### ***II.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.

### **II.3. INTERNATIONAL LEGISLATIVE FRAMEWORK**

#### ***II.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 Tran boundary 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.

### ***II.3.2. International agreements***

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

**Table 2: 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.

#### **II.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 them “does no harm”. These safeguard policies are grouped into Environment, Rural Development, Social Development and International Law.

The following safeguard policies have been considered in the EARP- SEA.

##### ***II.4.1. 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.

#### ***II.4.2. 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.

#### ***II.4.3. OP 4.36 Forests (November 2002)***

Aims to reduce deforestation and enhance, through sustainable economic development, the environmental and social contribution of forests. The Bank does not support projects which involve significant conversion or degradation of critical forest areas or related critical natural habitats.

#### ***II.4.4. 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.

#### ***II.4.5. OP 4.10 Indigenous Peoples (July 2005)***

Indigenous peoples in particular geographical areas are identified by having: a close attachment to ancestral territories and to the natural resources in these areas; self-identification and identification by others as members of a distinct cultural group; an indigenous language, often different from the national language; presence of customary social and political institutions; and primarily subsistence-oriented production.

The Bank's objective is to ensure that indigenous peoples do not suffer adverse effects from Bank financed projects and that they receive culturally compatible social and economic benefits. Effectively the World Bank requires a project to develop a program for addressing issues based on the informed participation of the indigenous people themselves. Any project that affects

indigenous peoples is expected to include components or provisions that incorporate an “Indigenous Peoples Development Plan”.

#### ***II.4.6. 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 7.50: International Waterways

Operational Policy (OP)/Bank Procedure (BP) 7.50: Projects on International Waterways may affect the relations between the World Bank and its borrowers, and between riparian states. Therefore, the Bank attaches great importance to the riparian’s making appropriate agreements or arrangements for the entire waterway, or parts thereof, and stands ready to assist in this regard. In the absence of such agreements or arrangements, the Bank requires, as a general rule, that the prospective borrower notifies the other riparian’s of the project.

The Policy lays down detailed procedures for the notification requirement, including the role of the Bank in affecting the notification, period of reply and the procedures in case there is an objection by one of the riparian’s to the program.

#### ***II.4.7. 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.

## **II.5. ENVIRONMENTAL INSTITUTIONS**

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 sectorial 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.

### ***II.5.1. Ministry of Natural Resources (MINIRENA).***

MINIRENA is a multi sector 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.

### ***II.5.2. Other key Ministries and institutions***

- MINAGRI: sets national policies on agriculture, livestock and fisheries and provides guidelines and standards for land use management including terracing. MINAGRI is also charged with development of arable land for agricultural production and animal

husbandry. The Ministry works closely with RAB, LWH and RSSP which provide technical support and regulatory oversight in the procurement and distribution of agriculture and livestock facilities for beneficiary communities.

- 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.

- MINICOM: sets policy for trade, tourism and cooperatives and industries (including small scale artisans). MINICOM is responsible for the promotion of industries, trade and organization of agro-livestock production cooperatives and management of protected tourism areas. The Ministry promotes export and marketing of handcraft and tourism as well development and regulation cooperatives and rural association. MINCOM is therefore charged with integrating environment in trade and industrial policies and strategies including promotion of friendly environmental export trade of handcraft and tourism; promotion of cooperative and rural associations.
- MININFRA: is responsible for setting policies related to energy include 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.

- 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.
- MINIJUST: is the lead Ministry responsible for development and advising on formulation of laws and regulations in the country. The Ministry oversees the formulation and enactment of various laws and regulations including those that are pertinent and regarding to the ENR sectors. It is charged with advising and following up regional laws including the domestication of EAC treaty as well as providing advisory and legal support pertinent to conflicts resolution.
- 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.
- MINISANTE: is responsible for development and overseeing the implementation of Environmental health related programmes that mitigate water borne diseases, malnutrition and HIV/AIDS. The Ministry is also concerned with promoting of hygiene among the population; developing policies, strategies and guidelines for sanitation as well as medical waste disposal and treatment.
- 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 2002, 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 natural resources Authority (RNRA): RNRA is an authority under the Ministry of Natural Resources that heads the management of promotion of natural resources which is composed of land, water, forests, mines and geology. It is entrusted with supervision, monitoring and to ensure the implementation of all issues relating to promotion and protection of natural resources, Implementing national policies, laws, strategies, regulations and government resolutions in matters relating to the promotion and protection of natural resources; Making follow up and to implement international conventions Rwanda ratified on matters relating to natural resources management, Advising the Government on appropriate mechanisms for conservation of natural resources and investments opportunities; establishing cooperation and collaboration with other regional and international institutions with an aim of harmonizing the performance and relations on matters relating to management of natural resources. RNRA is coordinate and supervise activities of its 3 child agencies, which are: [National Land Centre \(NLC\)](#), [OGM](#), Integrated Water Resources Management (IWRM) and [National Forestry Authority \(NAFA\)](#).
- Energy Development Corporation Limited (EDCL): The Company has as mission to create conditions for the provision of sufficient, safe, reliable, efficient, cost-effective and environmentally appropriate energy, supply energy services to households and to all economic sectors on a sustainable basis. It has a vision of contributing effectively to the growth of the national economy and thereby improves 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.

- Rwanda Utilities Regulatory Agency (RURA)

The RURA energy sector's mission is to control and regulate an efficient, sustainable and reliable energy sector in a transparent and fair manner for the benefit of all stakeholders.

- 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.

## CHAP III: BASELINE THE ENVIRONMENT

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### III.1. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

This chapter gives background information of the subproject area as whole specific sites in terms of its location, physical and socio-economic environment, which will play a crucial role in the identification, predict and analysis of environment impacts and proposed the appropriate mitigations of measures.

### III.2. EASTERN PROVINCE

#### *III.2.1. Subproject Location*

The Eastern province is located in East of the Country near the Republic of Tanzania and are composed by 7 Districts: **Nyagatare, Gatsibo, Kayonza, Rwamagana, Bugesera, Ngoma and Kirehe Districts**. However, this programme started on this area and it's an extension of the remaining area which are not electrify. The methodology was sampling the zone on which many households are concentrated into centers or villages. Some subprojects are located in **Rwamagana District** especially in the Sectors of *Fumbwe and Musha*, others are located in **Gatsibo District** especially in the Sectors of *Muhura, Remera, Murambi, Kiziguro, Kiramuruzi*, we find also others in **Kayonza District** specifically in the Sectors of *Gahini, Mukarange, Murundi, Nyamirama and Mwiri* and **Ngoma Distrcict** particularly in Sectors of *Remera and Kibungo*.



The region of Eastern Province is known as an area of low rainfall and high temperatures. The days are very hot and the nights are very cold. The Climate is composed by the temperatures which are higher and the extreme can go beyond 20 degrees.

Degrees in February and July-August. The absolute temperature of 32.8 degrees was recorded. This characteristic of the climate will not favourable for increasing agriculture production.

**Figure 2: Relief and physical environment of Eastern Province**



### ***III.2.3. Flora and Fauna***

The project area has natural flora mainly composed by dispersed trees and other tree species notably *Lantana camara* (Umutamutamu), *Combretum molle* (Umurama), *Combretum collinumb inderianum* (Umukoyoyo), *Ozoroa reticulata* (Umukerenke), *Tecleanobilis* (Umuzo), *Gardenia ternifolia* (Umutarama), *Acasia hokii* (Umugenge), *Rhynchosia orthobotrya* (Umuvumbura nkwavu), *Zanthoxy lumusambarensis* (Intarey'irungu), *Clerodendrum formicarum* (Umwanzuranya), *Grewia platyclada* (Umukorokombe), *Rhus vulgaris* (Umusagara), *Grevillea robusta* (gereveriya), and *Eucalyptus* sp. (inturusu). The project area has different tree species since one part of the project area used to be in the boundaries of Akagera National Park

before 1994. The above mentioned tree species have economic importance as well as medicinal importance (Umukoyoyo, Umukorokombe, Umwanzuranya and Intarey'irungu). The existing land use in the neighbourhood of project area included subsistence crops like banana, sorghum, beans, maize, fruits, legumes, tomatoes, sweet potatoes, and forages such as pennisetum tribisacum. The site also presents different types of bushes that can, on the wildlife point of view, shelter rodents and lizards or serve as ecological niche for various types of birds. Some of these animals are Banded Mongoose “Mungos mungo” (Akayongwe), Mwanza flat-headed Agama “Agama mwanzae” (Icyugu), African striped skink ‘Mabuyastriata” (Umuserebanya), Speke’s hinged tortoise “Kinixyspekii” (Akanyamasyo), different types of snakes including Angolan green Snake “Philothamnus angolensis” (Incarwatsi), Gunther’s Green Tree Snake “Dipsadoboa unicolor” (Incana), Common egg-eater “Dasypeltis scabra” (Imbarabara), Central African Rock Python “Python sebae”.

In the project area the farming system is mixed which is dominated by crop production and supplemented by animal husbandry. During the field survey it was found that cassava, Sorghum,

**Figure 3: Local flora of Gatsibo District**



### ***III.2.4. Geology and soils***

Since the project site lies within the Precambrian basement complex of the country, the site and its immediate environ are underlain by folded metamorphic rocks that are identified as mica schist intercalated with quartzite. Outcrops of mica schist are observed on slopes and hill sides including the left abutment of most of the project areas, though the rocks are weathered to various degrees and altered to lose materials. The schist formation exhibits schistosity planes steeply dipping in the downstream direction and joints and discontinuities that form isolated beds of similar orientations. The rock is intensely affected by post hydrothermal activities as featured by several quartz veins and vein let that intersect the parent rock.

### ***III.2.5. Housing and Settlement***

The housing in the Eastern Province is characterized by 4 different type the well-developed urban area (Rwamagana, Kayonza and Ngoma), urban areas in settlement (Ngoma), Villages - imidugudu (Rwamagana) in rural areas and house scattered in rural areas. Most of time, you find many households which are scattered in the landscape and this, give the complexity to connect a lot of households at the sometime.

**Figure 4: Rural settlement in Eastern Province**



### ***III.2.6. Energy***

The main sources of energy used for cooking are firewood and charcoal. In Rwanda, 86% of population use firewood especially in rural areas. This excessive use of biomass energy is among the direct cause of environment degradation in the country resulting the overexploitation of the forests. However, in urban areas (Rwamagana, Kayonza and some areas of Gatsibo), they use electricity for lighting.

## **III.3. DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT**

### ***III.3.1. Agriculture***

Banana, Plantain, Beans, Sugarcane and coffee are the dominant crops that are grown in the project area. Most of these crops are grown for home consumption and for local market supply. Banana being the major staple food crop for the area used for food, local drinks, and also serves as cash crop. In the valley bottom of the study area vegetables like tomato, paper, cabbage carrot and pineapple, root crops like cassava, taro, and Irish potato, field crops such as Sorghum, Beans, Maize and perennial crops like Avocado and Coffee are grown under both rain fed and irrigated conditions. Based on crop survey conducted in the project site, the major portion of the agricultural land is covered by Plantain 30-35% and Beans 25-30% while the remaining balance is covered by sugarcane and by aforementioned crops.

Both the valley bottom and the hillside slopes are intensively cultivated and covered with cooking banana plants. The major crops grown in the area are predominantly cooking banana, tomatoes, groundnuts, cabbages, Napier grass, beans, Irish potatoes, cassava and sweet potato.

The project site falls in the Dry Low Land agro climatic zone. The project site is located in a relatively low rainfall area with a mean annual rainfall of less than 900 mm. The rainfall pattern is bimodal with the short rains season lasting from September – November and the long rain season from February - May. The maximum rainfall is in March, exceeding 120 mm/month, during the main rainy season. October receives the highest amount of rainfall in the second rainy season. June is the driest month. The temperatures range between 15.50 degrees C and 20 degrees C.

Underwent different degrees of weathering ranging from moderate to complete weathering, the latter resulting in clayey silt to silt clay residual soil. The main rock unit is covered at many places by thick (more than 5m) soils of residual and transported origin, and predominantly clayey silt to silt clay texture.

Major economic activities in Eastern Province are livestock keeping and agriculture. The Eastern Province is home to the nation's milk-producing cattle keepers. Other livestock kept include sheep, goats, poultry, pigs, bees and fish. Major crops grown include Rice, Maize, Beans, Sorghum, Cassava and Potatoes. The eastern province intends to promote the cultivation and processing of, Cassava and Banana-based products. There is a variety of farm products cultivated in the higher altitude north and in the lower altitude central, east and southern parts of the province.

It has fertile agricultural land, producing crops like rice, maize, Cassava, Bananas, beans and coffee. Lush pastures support the cows which produce milk for nation, as well as sheep, goats and poultry. The six districts of Eastern Zone make a big share to Akagera National Park, shared by variety of fauna and flora, and animals such as elephants, giraffes, hippopotamus, and other touristic attractions. We observe also big Centers in Rwamagana and Kayonza with a flourishing commerce (bank, assurance, cyber coffee building.....).

**Figure 5: Rice plantation in marshlands in Kiramuruzi Sector/Gatsibo District**



## CHAP IV: IDENTIFICATION, ANALYSE OF KEY POTENTIAL IMPACT AND PROPOSED OF MITIGATIONS MEASURES.

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### IV.1. NATURE AND EXTEND OF POTENTIAL ENVIRONMENT IMPACT OF PROPOSED ACTIVITIES.

This subproject and its activities will 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 proposed mitigations measures of these impacts that could arise from the implanted activities either during the construction phase or the operational and maintenance phase.

The impacts also applied 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).

### IV.2. IMPACTS IDENTIFICATION

#### *IV.2.1. Impacts during Construction phase*

##### **IV.2.1.1. Positive Impacts**

Throughout the construction period, local inhabitants of this area are positioned to benefit in the following aspects:

- i. Employment:** to the locals with the bulk of the staff recruited from within the area. The developer will commit to a policy that gives priority to the locals in the neighbourhood at the time of employing casual or skilled labour. This positive impact is temporary regarding the time of project in the area because people will get jobs for a short period
- ii. Government revenues:** revenues shall be collected by Government from the procurement of construction materials and finishes, employees' salaries, such as; VAT from sold products (the whole trading chin) among others. This positive impact is permanent because the project will be benefit for increasing the GDP off the country.

- iii. **Project as an income earner to truck and machine owners :** Truck and machine owners will earn from renting out their vehicles for transportation of construction material and machines that will do various construction activities (excavations, clearing, loading, levelling, using graders, excavators, among others).For prediction and analysis of this impact, some local will benefit temporary for this subprojects.
- iv. **Affordability of medical insurance for workers:** Employees shall from their pay afford medical insurance (Mutuelle de santé) and even pay school fees for their children. This impact will give the opportunity to the local workers to keep the good health even this period is very short.

#### **IV.2.1.2. Negative Impacts**

As the construction goes on, the adverse impact will occur later .For instance, it will be a number of excavations, soil disturbance and increased traffic around the site as a result of heavy trucks delivering various construction raw materials and taking away the generated waste including construction debris. All these are likely to pollute and degrade the local environment, through mud slides, noise, and dust and air pollution. Potential adverse impacts emanating from construction activities are described in detail here below:

#### ***IV.2.2. Impacts at Pre-construction phase***

##### **IV.2.2.1. Line Route Survey and Asset losses.**

During line route survey and assets losses, there will be a visual of environmental degradation especially destruction of natural vegetation, food and cash crops. Furthermore, it will include the destruction of sensitive ecosystems such as wetlands or protected areas but survey must avoid the zone in terms of taking environment risk. Concerning, the sensitive ecosystems, the contractor has duty to avoid or minimize the impact. To minimize the impact, stakeholders and beneficiaries must be involve on survey and inventory of Assets and Crops.

##### **IV.2.2.2. Site selection and planning design.**

Poor site selection for transmission and distribution can be source of destruction of sensitive ecosystems or reviewing the proposed sites. Planner must be aware of environmental conservation and avoiding negative impact of the future proposed subprojects. However, the size of the impact is very low because the right of way is very small

### ***IV.2.3. Impacts at Construction phase***

#### **IV.2.3.1. Earth excavations**

During site earth excavation, foundation excavation and site levelling, large masses of soil are likely to displace. The excavation and earth moving will expose the ground to potential erosion from both storm water run-off and wind. Increased movement of traffic on site especially from trucks disposing off the excess murrum. The excavation equipment will be a potential source of noise pollution and gases from exhaust. The strategies of mitigations actions will be involving local communities who knows the areas in order to avoid the destruction of infrastructures.

#### **IV.2.3.2. Heavy truck and machinery movement**

It obvious, that there are bound to be trucks delivering construction materials and disposing debris to dumping sites. This project might also acquire equipment such as; excavators, wheel loaders, dampers for purposes of clearing, leveling and moving earths. The consequence of those trucks movement will create noise and air pollution. The strategies proposed will be minimizing the number of deliveries through timely scheduling.

#### **IV.2.3.3. Construction of Access Roads**

The construction of access roads can impact the environment through vegetation clearance and compaction of land and a permanent loss of land. Provided temporary access roads are rehabilitated and existing roads/tracks are used for access to minimise the number of new roads required, the impact is not expected to be significant at the workplace

#### **IV.2.3.4. Rehabilitate of existing roads/trucks**

The rehabilitation of existing tracks can have impact the environment through vegetation clearance and compaction of land and a permanent loss of land. This activity will be done to minimize the number of new roads required; the impact is not expected to be highly significant.

#### **IV.2.3.5. Construction of Transmission Line poles**

Clearing of vegetation, site compaction and land acquisition has the potential to change land use patterns. However, the area required for each tower and the transmission line is not expected to have a major adverse impact on land use patterns.

#### **IV.2.3.6. Disposal of construction debris**

Most activities involved in the construction phase are waste generators, such as: excavated glasses, metal and debris, concrete, card board, organic waste on site (from fruits, foods...among others).However, debris from different activities during construction shall definitely affect environment. Poor solid waste management creates an eye sore giving the natural beautiful scenery a less pleasing perspective. Collect solid waste correctly and burry off sites with applicable government waste management regulations.

#### **IV.2.3.7. Soil and water pollution**

Any spillage of fuel from machinery works during operation and maintenance of the transmission line power may have impact on soil and water pollution. Store of all liquid material (e.g. fuel, engine oil...) must be avoiding rise out. To minimize the impact, each worker must wearing his PPE and having his insurance (mutuelle de santé).

#### **IV.2.3.8. Surface and ground water**

No significant impacts on the surface and ground waters of the areas are anticipated during the operational phase of the transmission line.

#### **IV.2.3.9. Sanitary facilities**

During the planning phase of the project, temporary toilets (ECOSAN preferably) shall be planned for being used during site preparation, construction and operational project phases. Given the big number of workers expected during the construction phase, many impacts can be predicted, which are possible bad odours from the latrines that may be a dangerous and nuisance to the neighbouring residents. However, there is no significant impact of dumping sites which are vector of diseases. It was the duty of the contractor to implement the Health, Sanitation and Environment Plan which we will be available before starting activities.

#### ***IV.2.4. Impacts during operation and maintenance phase.***

##### **IV.2.4.1 Negative impact**

###### ***IV.2.4.1.1. Potential hazards/Accidents***

There is a possibility on lines or poles falling on the ground, and during the operation phase, contact with the transmission lines can result in electrocution. Even, some injuries or accidents which will occur at the work place. The contractor must record every day hazards, injuries which occurring at the site. The medical Kit for First Aid must be at the site for emergency intervention.

###### ***IV.2.4.1.2. Fire risk***

The risk of fire outbreaks during bad weather e.g. storms, winds etc. cannot be overruled especially when the electric poles crash or if electrical faults occur in the “mini” substations. Also failure to maintain the ROW could cause the overgrowth of nearby trees that could end up crashing on the lines during poor weather and hence cause fire outbreaks of black outs. That why each “mini” substation must be equipped by a extinguisher at the workplace.

###### ***IV.2.4.1.3. Accidents at work place from operating of machineries and equipment by workers***

There are sometime potential adverse impacts for accidents and hazards occurring during the operation of the equipment that could lead to loss of life or injury to the workers. However, there is no significant impact at the site during operation and maintenance phase. The contractors must be ready every time to intervene if necessary aware the insurance services for compensation.

###### ***IV.2.4.1.4. .Public Safety***

Placement of low slung lines or lines near human activity (roads, buildings) increases the risk for electrocutions. Also, poles and transmission lines injuries from workers .A strong mobilization and sensitization of electromagnetic risk to the beneficiaries is important.

#### ***IV.2.4.1.5. Birds Strikes/Collusions***

Transmissions and distribution networks are known to be a potential source of bird strikes that get entangled to the lines causing their injury or even instant death. This is especially more significant when large flocks of birds migrates from one points to another and usually get struck by these transmission lines. Public service in charge of biodiversity conservation has duty of joining the synergy of bird's protection.

#### ***IV.2.4.1.6. Aesthetics and visuals related impacts-visuals intrusion on the landscape***

Construction works especially when bad construction of poles and cables are likely to cause visual intrusion related impacts mainly by having activities out of touch with the natural environment. For instance, in Gatsibo and Kayonza, there is somewhere a significant impact of aesthetics and visual environment for some rural centers.

### **IV.3. PROJECT ALTERNATIVES**

#### ***IV.3.1. Analysis of “No Project Option***

The purpose of this chapter is to examine the possible alternatives for delivering the goals and objectives of the programme. 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 shows that the EARP implementation emerged as the best alternative.

#### ***IV.3.2. Alternative Routes***

An analysis of alternative routes is undertaken through mapping and involvement of all the stakeholders in this selection process. At the end of this process, alternative routes will selected among the possible ones, based on the following general sitting criteria (which are related to economic and environmental values):

- i. Avoidance of restricted zones (forests, parks);
- ii. Distance from zones of landscape value;
- iii. Distance from mountain edges, preference for valley routings;

- iv. Distance from urban areas;
- v. Route with constant slope;
- vi. Minimisation of infrastructure crossing (e.g. highways, other power lines, etc.).

### ***IV.3.3. On-Grid Electrification***

Provide on-grid electrification. This is the alternative that is proposed by this project. Through this all target sectors will be provided with electricity from the existing grid system and the new ones to be constructed. The project is expected to significantly reduce demand for firewood, as this is the primary source of heating and lighting in Rwandan communities.

This alternative will contribute positively to improving the lives of the target communities through reduced exposure to smoke, improvement in living conditions, increased communication via use of mobiles and opportunities for seeking alternative livelihood options. Local government institutions will also benefit through reduced time and money spent on sourcing firewood from local communities, as well as increase in accessibility to information through various media sources, internet and improved communication.

### ***IV.3.4. 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.

**Table 3: Environmental and Social Management Plan (ESMP).**

Project component s/Activity	Potential Environmental issues	Mitigation Measures	Responsibility	
			Planning and Implementation	Cost Estimates(USD)
<b>Pre-construction Stage</b>				
Design and location of Distribution lines and Asset loss	Dispute and conflict arise when the inventory of Asset started	<p>Ensure that the lands identified acquire the requirement of the government of Rwanda and the World Bank Policies and Guidelines regarding their environment polices.</p> <p>Involve and meaningfully engage the PAPs, general public including administration and local/traditional leaders in the resolution of land conflict.</p>	<p>EUCL</p> <p>EARP-PCU</p> <p>District authorities</p> <p>Contractors</p>	Included in the contract probably 1% of the project cost implementation.
Site selection and Routing	Poor sites selection and inadequate planning designs can cause possibly environmental degradation.	<p>Adequate survey and mapping will be carried out for new transmission and distribution route in order to avoid sensitive ecosystems.</p> <p>Ensure that during this process, each action taken must respect national environment regulation and World Bank Policies and Guidelines.</p> <p>Planners and surveyors must automatically respect mitigation measures which are containing into</p>	<p>EUCL</p> <p>EARP-PCU</p> <p>District authorities</p> <p>Contractors</p>	Included in the contract probably 1% of the project cost implementation.

		ESIA report.		
<b>Construction Stage</b>				
Clearing of RoW along distribution line and construction of new access roads, rehabilitate existing ones	Loss of vegetation and biodiversity, potential erosion and siltation on rivers and lake.  Fugitive dust may be emitted from construction works and stock piles of materials including machinery as well as from trucks traffic.	Respect the national environment regulation and World Bank Policies and guidelines in terms of soil erosion, biodiversity conservation measures.  Additional plantation and embracement using removed top soil is recommended near sensitive locations.  Conversion of access roads to the new routes and roads.  Environmental and compliance monitoring by environment officers, Workers in the project site must be equipped with the necessary and required Personal Protective Equipment (PPE) registered at international level.	EUCL  EARP-PCU  Contractors	Included in the contract probably 1% of the project cost implementation.
Excavation, erection poles and construction of transmission line.	Dust may blow from cleared areas	Avoid using big machinery, manual excavated at pole sites and minimize disturbance at excavated sites,	Contractors	Include in the contract
	Effect on local drainage and soil erosion	Located poles at a minimum distance of 30 m from rivers and 50m from lakes, and construct these on stable ground	EUCL  EARP-PCU  Contractors	-
	Excavation for	Consult local authorities, community	EUCL	-

	poles could damage water pipes in village	and beneficiaries to identify and avoid existing infrastructures.	EARP-PCU Contractors	
	Work in villages may create noise, dust & impede access	Before stating the work, try to inform local communities in advance, identify the areas with environment threats and local significance and consult custodians of facilities (schools, clinics, public buildings) and avoiding working at sensitive and religious times.	EUCL EARP-PCU Contractors	-
Disposal of construct debris	Dust and air Emission	Reduction of speed and limited movement of vehicles.  Use dust-suppressing water on unpaved roads, e.g. spraying of water with watering trucks in in advanced of transportation activities.  Use equipment with dust suction devices in enclosed spaces during civil works, where necessary.	Contractor	Include in the contract
Delivery of Sanitary facilities	Hygiene and sanitation issues and air pollution.  Dissemination of communicable and transmission diseases	Delivery mobile toilets (Aquasan) at the work place.  Delivery clean and drinking water at the sites.  Delivery soaps, toilets papers.....  Hiring permanent sites keepers for cleaning and bringing every day clean water.	Contractor	Include in the contract

		Fencing sanitary facilities and the stores sites.		
<b>Operation and maintenance phase</b>				
Potential hazards/ Accidents.	Electric and magnetic fields.  Death and injuries	<p>Follow EARP/EUCL O and M and H and S manuals and revise these manuals if necessary to increase safety of workers.</p> <p>Repair faults quickly and effectively.</p> <p>Conduct system maintenance regularly and diligently.</p> <p>Regular training of EARP/EUCL workers to raise awareness of dangers and working procedures to be follows.</p> <p>Improved supervision of field workers.</p> <p>Delivery appropriate material against fire risk (extinguisher).</p>	EUCL  EARP-PCU  Contractors	Include in the contract
Health and Safety	Accidents at work place during construction from operating of machineries and equipment by workers	<p>Develop an HSE Policy for the construction phase, in advance of construction activities.</p> <p>Development of an HSE Management Plan for the construction phase (shall include Waste Management Plan),in advance of construction activities.</p>	EUCL  EARP-PCU  Contractors	Include in the contract

		<p>Public education and outreach efforts to provide information about hazards awareness, upcoming construction activities, safety measures, reporting unsafe conditions and environment impacts, in advance of construction period.</p> <p>Regular management reviews of safety record, with remedial action where it is necessary</p>		
Social impact	<p>Poor performance at the workplace.</p> <p>Social conflicts and Disputes</p>	<p>Ensure that workers have insurance (Mutuelle de Sante).</p> <p>Mobilisation and training on best practices talking to good health and safety.</p>	<p>EUCL</p> <p>EARP-PCU</p> <p>Contractors</p>	Public budget
Solid waste	<p>Little if any solid waste will be generated which includes conductor and tree cuttings.</p>	<p>All left over conductor cutting to be disposed appropriately or be returned to the store for proper disposal.</p> <p>Proper budgeting of materials to reduce wastage.</p> <p>Practice 3 Rs of waste management: reuse, reduce and recycle of materials.</p> <p>Properly manage storage, transfer and disposal of transformer oils according to industry standards.</p>	<p>EUCL</p> <p>Contractors</p>	Include in the contract
<b>Decommissioning phase</b>				

Transformer s and cables	Waste Debris from equipment's and Machines when substation is dismantled	Ensure all the machines and equipment is disposed in the right places.  Explore available recycling opportunities.	EUCL  EARP-PCU	Public Budget
Poor disposal of used CFLs and exchanges IB.	Likely to lead to ground and surface water contamination.  CFLs contain mercury a hazardous heavy metal (substance) that is harmful to aquatic resources, soil resources and human population.  Soil contamination is a likely adverse impact if the CFLs are dumped in an open dumping site without mitigation measures and controls.	Ensure that all the IB s collected in exchange for the CFLs stored securely in appropriate warehouse until a disposal plan is prepared.  Develop a waste disposal plan for the disposal of the CFL lamps.  Identify a suitable store for keeping all the IBs.	EUCL  EARP-PCU	Public Budget
Health and safety	Accidents during decommissioning including oil spills	Minimize accident at the workplace/mitigation impacts specified in the construction phase of the project.	EUCL  EARP-PCU  Contractor	Public budget

## **IV.4. ENVIRONMENTAL AND SOCIAL MONITORING PLAN OF THE PROJECT.**

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### **IV.4.1. MONITORING PLAN**

A detailed environmental monitoring plan will be developed later 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 will provide for dust, noise, visual impacts, service disruption and safety monitoring.

During the operation period, monitoring will be planned in terms of routine inspection of the health and safety of the workers, disruption impacts during maintenance of ROW and probably fire hazards. The Monitoring Plan will be developed proposed by EARP-PCU at the end during environmental monitoring process.

Environmental monitoring is an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measure, 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 Supervision Consultant who will be responsible for reporting process. Actually, the Contractor's responsibility to monitoring inventory Assets and crops and compensation issues.

**REG-EUCL** will 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. REG-EUCL also will have the direct responsibility to supervise inventory Assets and Crops and compensation issues as outlined in the on-going preparation RAP.

RDB has the overall responsibility for issuing approval for the Project and ensuring that their environmental guidelines are followed during Project 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 of the Project unless some specific major environmental issue arise.

Environmental monitoring of the following parameters is recommended as a minimum for EARP-EUCL subprojects:

### **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 (PAPs) in the first instance to identify the level of monitoring required.

### **Soil Erosion Monitoring**

The excavation of earth for erection of poles, temporary and permanent access roads, and storage facilities 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 poles. The Contractor's environmental inspectors should make sure that the unique tree stands identified during the present study should not be removed.

## **Table 4: Environmental and Social Monitoring Plan (ESMP)**

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### **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 either REG-EUCL environmental staff. He has the duty of implement the EHS plan and proposed EMP.

### **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:

Project components/A ctivities	Negative impacts	Mitigation Measures	Benchmark period	Responsible	Cost
<b>Pre-construction Stage</b>					
Land/property acquisition impacts, loss of Assets, loss of land (access roads/) and other economic resources.	Disputes, complains and conflict arise when the inventory of Asset started	Respect the national environment regulation and World Bank Policies and guidelines in terms of soil erosion, biodiversity conservation measures.  Additional plantation and embracement using removed top soil is recommended near sensitive locations	Annually	MININFRA  MINICOFIN  REG-EUCL  EARP-PCU  Contractor	N/A
Site selection and routing.	Poor selection and routing can cause environmental degradation.	Adequate survey and mapping will be carried out for new transmission and distribution route in order to avoid sensitive ecosystems.  Ensure that during this process, each action taken must respect national environment regulation and World Bank Policies and Guidelines  Ensure that all workers have their PPE	Weekly	REG-EUCL  EARP-PCU  Contractor	N/A
		<b>Construction Stage</b>			

Excavation, erection poles and construction of transmission line	Dust may blow from cleared areas.	Avoid using big machinery, manual excavated at pole sites and minimize disturbance at excavated sites.	Monthly	EARP-PCU Contractor	Contractor
Solid waste and waste water management (sites, storage...).	Air and water pollution, problem of health and Sanitations (communicable and transmission diseases).	Delivery mobile toilets (AQUASAN) at the work place. Delivery clean and drinking water at the sites. Delivery soaps, toilets papers..... Hiring permanent sites keepers for cleaning and bringing every day clean water. Fencing sanitary facilities and the showers sites.	Monthly	Contractor	Contractor
Social Impact	Poor performance at the workplace. Social conflicts and Disputes	Ensure that workers have insurance (Mutuelle de Santé). Mobilisation and training on best practices talking to good health and safety.	Monthly	REG-EUCL EARP-PCU Contractor	N/A
<b>Operation and maintenance phase</b>					
Potential hazards/ Accidents.	Electric and magnetic fields. Death and	Regular training of EARP/EUCL workers to raise awareness of dangers and working procedures to be follows.	Occasional	EARP-PCU Contractor	N/A

	injuries.	Improved supervision of field workers.			
Health and Safety	Problems of Hygiene and Sanitation  Development of communicable and transmission diseases at the sites	Develop Health and Safety Policy and Health, Safety and Environment Plan of EARP/EUCL  Record regularly all hazards and injuries at the workplace.	Monthly	REG-EUCL  EARP-PCU  Contractor	N/A
Disposal of CFLs	Pollution of land (soil), river and other natural water sources.	Develop a waste disposal plan for CFLs debris.	Weekly	EARP-PCU  Contractor	N/A

## CONCLUSION

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The proposed construction of a power transmission lines project in Eastern Province is largely link with Government policies and World Bank Policies and guidelines for energy sector development. The project will benefits to the local people of this area and will strongly support initiatives towards poverty reduction and environment conservation based on the recommendations of EDPRS II.

According the field visit done in Eastern province, the mission found that there is no significant impact on project implementation but in some areas like Gatsibo, Kayonza District, based on the size of the zone, the will be a high cost implementation in terms of material, finance and human resources. However, the mitigation measures may be appropriate and within acceptable level.

In other word, adverse impact of construction and distribution of Electrical lines on environment in Eastern Province are not expected to be severe. The intervention will not pose major or important risks to biodiversity, natural habitats and wetlands as in protected areas like National Park of Akagera. All the potential adverse impacts of existing actions already done have been identified and discussed in the ESMF.

The present ESIA study recommends that the project development should precede, but factor in the implementation of mitigation measures are proposed herein. The key mitigations measures will depend on the choice of the construction material, disposal of waste water and solid waste, access of drinking water, the private protection equipment and the best management storage

Implementation of those recommendations and others proposed in the present document will a high contribution to minimize negative impact which will occur very late when the project will be started. REG-EUCL, EARP-PCU concerned Districts and local beneficiaries shall take their responsibilities to closely environmental monitoring activities especially at construction and operational stages as well and at the same time environment funds will be agreed by all stakeholders for all planned activities.

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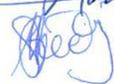
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## **PROJECT DESCRIPTION**

**Nature of the project:** Construction of substation, transmission and distribution network in 4 provinces of Rwanda.

**Project Objectives:** To improve reliable on-grid electricity services for households and priority public institutions in the 4 provinces.

**Specific objectives:** Construction of substations, transmission and distribution network in 4 provinces of Rwanda.

### **Project Cost**

**Total Project Cost:** About 7 million USD

### **Land**

**Total Land Area (sq. meters or ha):**To be determined after survey

**Existing land use:** Mixed residential commercial and agricultural use.

### **Project Site**

Description of the general location of the project site.

**Developed Area (within a built-up-area with presence of utility systems or network, especially water supply, roads and power supply)**

**Under-development Area (relatively far from the urban center with**

**Predominant absence of utility system)**

Other particulars, specify

**Land Use Classification (base on approval land use plan of the City or District or Province),**

*[X] RESIDENTIAL [X] COMMERCIAL [X] AGRICULTURAL*

*[X] INDUSTRIAL [X] INSTITUTIONAL*

Tourism  Open Space

**Project Components:**

**I. Eastern Province LOT (Kayonza, Gatsibo, Ngoma and Rwamagana District)**

	<b>SUM MV LINES (km)</b>	<b>SUM LV LINES(km)</b>	<b>SUM TRANSFOR MERS</b>	<b>SUM MV SWITCH GR</b>	<b>POTENTIAL CONN'S</b>	<b>COST(USD)</b>
<b>Lot 4</b>	75.84	120.30	59	4	6,566	4,876,859
MV_LV1	13.95	23.65	8	0	1,489	1,014,178
MV_LV 3	25.00	37.15	22	1	1,312	1,344,350
MV_LV 4	46.31	64.84	35	2	2,694	2,415,677
MV_LV 12	14.14	22.47	12	0	576	782,727

Source: Project Brief

**Project activities during all phases** (Design, Implementation, Operation, and Decommissioning)

**Design:** Topographic surveys, site clearing, land documents acquisition, demarcation of right of way.

**Implementation:** Site installation, construction of foundations, installation of poles, installation of transmission and distribution lines, testing and adjustment.

**Operation:** Maintenance of Transmission and distribution lines, trimming of grown up trees.

**Decommissioning:** Demolition of structures and vegetation restoration

## Utilities and Infrastructures

### Water Supply

- *Demand*

What is the estimated daily water requirement for the entire project during Project implementation: **500m<sup>3</sup>**

Water demand during operation: **50 m<sup>3</sup> / month**

- **Supply**

Is the project going to connect to an existing public water supply system?

Yes                     No

- **Water Treatment**

Is there provision for water treatment?

Yes             No             N/A

### Sewage Disposal System

- Sewage System:

Modern waste water treatment plant

**Ecosan toilets**                     Biogas plant

**Septic tank**

- Sewage Design: Capacity in Population Equivalent (PE): **10 PE**

### Power Supply

Source of power supply:

**Local Electric REG grid:**

Own Generator            Capacity (KVA) \_\_\_\_\_

Others, please specify \_\_\_\_\_

## 2.9 Solid waste management

Types of solid wastes to be generated during all project phases:

- Disposal system

Ecological solid waste management (e.g. composting)

**[ X ] Open dumpsite outside of the project site**

municipal/city landfill area

others \_\_\_\_\_

**Manpower and Employment**

How many people will be employed by the project?

During the Design/implementation period: **400**

During the operation and maintenance period: **10**

**Project implementation duration**

How long will the implementation/construction period take? **18mont**

**DESCRIPTION OF PROJECT SURROUNDINGS**

**Physical Environment**

Components/Parameters	Answers		Remarks
	Yes	No	
What is the general elevation of the project area?			<b>Average 1600msl</b>
Are there areas in the site where indications of soil erosion are occurring? If yes, what activities are causing erosion?	<b>X</b>		Causes of erosion: <b>[ X ] heavy rains</b> <b>[ X ] unstable slopes</b> <input type="checkbox"/> others, please specify
Are there existing water bodies found near or within the site, e.g. creeks or streams, Lake? If yes, please enumerate them in the opposite space and indicate their location (distance from project site).		<b>X</b>	<b>NO water bodies within project area</b>
Is there an access road going to the project site? If yes, what is its distance to the site: <b>maximum 1 km</b>	<b>X</b>		Type of access <b>road:</b> <b>murrum roads and asphalt roads</b>

Components/Parameters	Answers		Remarks
	Yes	No	
Does the site conform to the approved land use plan of the city/Districts?	X		<b>Land use approved by districts</b>
Are there existing structures or developments around the project sites? If yes, please list them in the opposite space.	X		<b>Modern markets</b> <b>Modern landfill</b> <b>Small factories</b> <b>Schools</b> <b>Health centers</b> <b>Sector and cells offices</b>

What is the present land use of the area?

**Agriculture Land**

**Grassland**

**Marshland**

**Built-up**

**Others, pls. specify only factories, industries and warehouses.**

### Biological Environment

Components/Parameters	Answers		Remark
	Yes	No	
Do there exist trees and other types of vegetation in the site? If yes, please provide examples.	X		<ul style="list-style-type: none"> <li>• Eucalyptus</li> <li>• Shrubs</li> <li>• Cyprus</li> <li>• Other species</li> </ul>
Are there birds and other forms of wildlife found in the area?		X	

Are there fishery resources in the water bodies found near or within the site?		<b>X</b>	
Is the site near or within a watershed or forest reservation area? If near only, how near? _____ m or km If within, indicate name of the watershed or reservation area.		<b>X</b>	

### Socio-Economic Environment

Components/Parameters	Remarks
Are there existing settlements in the project area? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Average family size:	<b>6</b>
What are their source(s) of livelihood?  <u>Livelihood Type</u> <input checked="" type="checkbox"/> <b>farming</b> <input type="checkbox"/> fishing <input checked="" type="checkbox"/> <b>vending / buy and sell</b> <input type="checkbox"/> Tourism <input checked="" type="checkbox"/> <b>Livestock</b> others, please specify administrative	

Are there other existing local organizations in the area?  Yes  No

Are there existing social infrastructures in the project area?  **Yes**       **No**

If yes, what are these social infrastructures?

**Schools**                                       communication (radio, TV, newspaper)

**Health centres'**

/clinics       **churches/chapel**

**hospitals**                                       **roads**

**transportation**                               **Hotels**

Others,

**PREDICTED IMPACTS AND PROPOSED ENHANCEMENT/MITIGATION MEASURES**

**Project design & implementation Phase**

Predicted Impacts	Answers		Proposed Enhancement/ Mitigating Measures	Remarks
	Yes	No		
1. Increase in dust generation due to clearing, civil works and earthmoving activities	X		<input checked="" type="checkbox"/> Regular watering of unpaved roads or exposed soils/ground <input checked="" type="checkbox"/> Remove soil /mud from tires of trucks and equipment before Leaving the area. <input checked="" type="checkbox"/> Hauling trucks should be covered with canvass or any equivalent materials	
2. Top soil removal and loss due earthmoving activities, transport, access road construction	X		<input checked="" type="checkbox"/> Stockpile the top soil in a safe place and use as final grading material or final layer <input checked="" type="checkbox"/> As soon as possible, rip-rap or re-vegetate the area	
3. Erosion from exposed cuts and landslides due to earthmoving and excavation activities	X		<input type="checkbox"/> Conduct construction activities during dry season <input checked="" type="checkbox"/> <b>Avoid long exposure of opened cuts</b> <input type="checkbox"/> Installation of barrier nets	

Predicted Impacts	Answers		Proposed Enhancement/ Mitigating Measures	Remarks
	Yes	No		
4. Sedimentation/ siltation of drainage or waterways from unconfined stockpiles of soil and other materials		<b>X</b>	<input type="checkbox"/> Set-up temporary silt trap/ponds to prevent siltation <input type="checkbox"/> Proper stockpiling of spoils (on flat areas and away from drainage routes <input type="checkbox"/> Spoils generated from civil works be disposed as filling materials	N/A
5. Pollution of nearby water body due to improper disposal of construction wastes		<b>X</b>	<input type="checkbox"/> Set-up temporary disposal mechanism within the construction area and properly dispose the generated solid wastes. <input type="checkbox"/> Set up proper and adequate toilet facilities <input type="checkbox"/> Strictly require the contractor and its workers to observe proper waste disposal and proper sanitation	N/A

Predicted Impacts	Answers		Proposed Enhancement/ Mitigating Measures	Remarks
	Yes	No		
5. Loss of vegetation due to land clearing	X		<input checked="" type="checkbox"/> <b>Limit land clearing as much as possible</b> <input type="checkbox"/> Provide temporary fencing to vegetation that will be retained <input type="checkbox"/> Use of markers and fences to direct heavy equipment traffic in the construction site and avoid damage to plants <input checked="" type="checkbox"/> <b>Re-plant/ plant indigenous tree species and ornamental plants</b>	
6. Disturbance or loss of wildlife within the influence area due to noise and other construction activities		X	<input type="checkbox"/> Re-establish or simulate the habitat of affected wildlife in another suitable area <input type="checkbox"/> Schedule noisy construction activities during day time <input type="checkbox"/> Undertake proper maintenance of equipment and use mufflers	N/A
7. Noise generation that can affect the nearby resident	X		<input checked="" type="checkbox"/> Schedule noisy construction activities during day time <input checked="" type="checkbox"/> Undertake proper maintenance of equipment and use mufflers	
8. Generation of employment	X		<input checked="" type="checkbox"/> Hiring priority shall be given to qualified local and unskilled residents	In addition, women shall be given priority

Predicted Impacts	Answers		Proposed Enhancement/ Mitigating Measures	Remarks
	Yes	No		
9. Conflicts in right of way	X		[X] Conduct consultation and settle agreements before finalizing detailed design	Local leaders to play a big role
10. Increased traffic and possible congestion	X		[X] Strict enforcement of traffic rules and regulations [X] Proponent should provide traffic aid during peak hours	
11. Increase in the incidence of crime and accidents	X		[X] Strictly require the contractor and its workers to follow safety rules and regulations in the construction and in the locality (in coordination with local authorities)	

## Operation Phase

Predicted			Proposed Enhancement /Mitigating Measures	
1. Generation of domestic effluents		<b>X</b>	[ ] Provision of adequate wastewater treatment facilities	
2. Generation of solid wastes	<b>X</b>		[X] Segregation of recyclable materials [ X ] Proper collection and disposal of solid wastes [ X ] Proper housekeeping and waste minimization	
3. Increased traffic and possible congestion as well as increase risk of vehicular and related accidents	<b>X</b>		[ X ] Strict enforcement of traffic rules and regulations [X] Placement of signage and warnings in appropriate places	Sign posts should be part of the project

Predicted			Proposed Enhancement /Mitigating Measures	
4. Risk of fire	<b>X</b>		<input checked="" type="checkbox"/> Fire extinguishers in good working condition installed in each corner of substation <input checked="" type="checkbox"/> Exit stairs provided and shown on plans clearly posted at entrance	