ELECTRICITY ACCESS ROLLOUT PROGAMME (EARP)

Rwanda Electricity Sector Strengthening Project (RESSP)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR PLANT DESIGN, SUPPLY AND INSTALLATION OF MV & LV LINES CONSTRUCTION AND SERVICE CONNECTIONS OF ELECTRIFICATION OF RULINDO, BURERA AND RUBAVU DISTRICT, NORTH-WESTERN AREAS OF RWANDA (refer to Contract No 11.07.023/6325/17/EDCL-MD/YN/cm)

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LIST OF ABBREVIATIONS

AIDS : Acquired Immune Deficiency Syndrome
ASALs : Arid and Semi-Arid Lands
COSHH : Control of Substances Hazardous to Health
EDCL **:** Energy Development Corporation Limited
EARP **:** Electricity Access Rollout Program
EMF : Electro-Magnetic Fields
EIA **:** Environmental Impact Assessment
ESIA : Environmental and Social Impact Assessment
ESMP : Environmental Management Plan
EU : European Union
EUCL **:**Energy Utility Corporation Limited
HIV **:** Human Immunodeficiency Virus
ILO **:** International Labour Organization
KV : Kilo volt – 1,000 volts
MW : Megawatts
OTHL : Overhead Transmission Lines
REMA : Rwanda Environmental Management Authority
PAPs : Project Affected Persons
RAP : Resettlement Action Plan
REG **:** Rwanda Energy Group
RESSP **:** Rwanda Electricity Sector Strengthening Project (RESSP)
ROW **:** Right of Way
WB **:** World Bank

EXECUTIVE SUMMARY

Purpose

This plan Report has been prepared following a request by the Client-Energy Development Corporation Limited (EDCL), to the Contractor" Lucky Exports" through the consultant, to develop an Environmental and Social Management Plan (ESMP) for the electrification of Rulindo, Burera and Rubavu Districts.

Background

The Government of Rwanda received funds from the World Bank, to finance the construction of approximately **128.65**km of Medium Voltage (MV) and **225.4**km of Low Voltage (LV) and expected to connect almost **14,305** households.

The study conducted conformed to the requirements of the WB environmental and social policies, guidelines and assessment procedures in addition to those of Rwanda Environmental Management Authority (REMA).

Objective

The objective of the assignment was to preparation a detailed ESMP to address the anticipated negative environmental and social project impacts of the project.

Scope of the ESMP

The scope of services undertaken by the Consultant included the preparation of the ESMP whose purpose was to define and reach an agreement with project sponsors concerning the following:

- Mitigation and enhancement programs
- Monitoring programs
- Consultations
- Complementary initiatives
- Responsibilities and institutional arrangements

- Estimated costs
- Implementation schedules and reporting

Methodology

The consultant adopted a participatory methodology during the study. Several consultative meetings were conducted with Stakeholders, EDCL/EARP/RESSP and the communities. The consultant further reviewed various legal issues relevant to the exercise. The existing Environmental Assessment Reports was reviewed in detail by the consultant. The following section provides a brief of the key findings.

Legislative framework

Chapter Two of this project report outlines several legislative issued that were considered during the exercise. This is to ensure that the proposed project compliers with the relevant legislative and planning requirements of Rwanda. They generally comprise of legislations that encompass laws relating to environment, agriculture, water, public health and land. EDCL/EARP/RESSP land acquisition procedure has also been discussed in detail for both Medium and low voltages Lines. The project in question generally conforms to the legal requirements outlined in Chapter Two and subject to the ESMP proposed in Chapter Six of the present report.

Major environmental and social impacts

1) Adverse Impacts:

Distribution network systems extension can be expected to have minor direct and indirect impacts on villages where the proposed lines will pass. The potential for negative direct impacts might be in any social and cultural interaction between the contractor's workers and local populations. There may also be minor effects on agriculture, if there would be a restriction on land use in the right of way to the areas where distribution lines pass, and, in any involuntary resettlement requirement. Issues addressed in the ESMP include negative impacts with respect to the biophysical environment, the main aspects

analyzed are the impacts of the project on water resources, tree cutting, local land degradation and soil erosion, slope stability, aesthetics and visual impact and ecological issues.

2) Positive Impacts

The major positive impacts are related to job opportunities. The direct and indirect job opportunities that will be provided by the project can be considered as a positive aspect. The local people will be directly employed to work at the construction sites. Some individuals may gain skills that can be applied in other transmission line construction projects. The benefits of the project for domestic supply and use in small-scale businesses and in access to electric power for schools and public services are evident:

- ✓ Potential beneficiary enterprises affected by and contributing to regional socio-economic transformation will be small industries like saw mills and joineries, grain mills and other agricultural processing and storage businesses.
- ✓ Data management with computers is enabled along with communication facilities such as the internet and charging of mobile phones. Electric lighting adds to security at night and enables extended opportunities for work and study. As a consequence, the quality of life and extent of economic opportunity will be transformed.
- ✓ On the gender side, women should benefit from opportunities to work on the project as a result of project gender policy. Such income and opportunities for trading to salaried project workers and provide services to will help women to start small businesses.

3) Potential Socio-Economic Impacts

Along the road and within the right of way there may be housing units, fences of different types, farmland, grazing land and national parks. During the construction period, some of these properties will be affected. This will cause an adverse impact on the socio-economic situation pertaining to the project area communities.

Loss of property is the main socio-economic impact of the electrification of Northern zone whereas constructing of MV & LV Lines. The impact on housing units will occur in almost all the towns and

villages along the road as individuals have constructed housing units for residence and business activities along the road.

Crops and trees: along the row, crops and trees owned by different farmers will be affected by the project. The project intends to mitigate this by minimizing passing in dense forests and expect to start construction activities during the dry and harvest season. Furthermore, other important potential socio-economic impacts which need to be managed include: health and safety threats, possible impact of immigrant workers, together with impact on aesthetic values.

Enhancement and mitigation program

Limited if any impacts are anticipated as planning and management for the project follows detailed frameworks developed for the project. Most distribution lines will follow road corridors and there should be very limited compensation requirements. Lines following roads adjacent to conservation areas will accommodate wildlife movement in their design and mitigate visual landscape intrusion and avoid unnecessary tree cutting or disturbance of some biodiversity.

Limited if any significant impacts on conservation, pollution control, plans to mitigate AIDS transmission risk and accidents, together with management of land loss and compensation arrangements.

Institutional arrangements and capacity building requirements

EDCL/EARP/RESSP will ensure implementation of the project ESMP with the support of its environmental staff. Contractors will be held to account for implementation of their responsibilities in the Project Management Matrix. Figure 1 shows the institutional arrangement for implementation of the ESMP under the project

PUBLIC CONSULTATIONS AND DISCLOSURE REQUIREMENTS

Public consultations have been held with local population in the project area EDCL/EARP/RESSP while preparing the ESMP. Furthermore, the standard procedures will be followed for disclosure in line with guidelines of the Funder the World Bank (WB) and Rwanda Environmental Management Authority (REMA).

IMPLEMENTATION SCHEDULE AND REPORTING

The implementation will be rolled out as required for each project component in line with the construction timetable and frameworks established for surveying and consultation, management and monitoring. EDCL/EARP/RESSP will have responsibility for social and environmental aspects of the projects. Supervision undertaken will also cover these aspects.

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1. INTRODUCTION

1.1 Purpose

This plan Report has been prepared following a request by the Client-Energy Development Corporation Limited (EDCL), to the consultant, to develop an Environmental and Social Management Plan (ESMP) for the electrification of Rulindo, Burera and Rubavu Districts of north-west areas of Rwanda.

i.Background, scope and project location Scope of planned works

The scope of Works for this contract, includes design, supply, and transportation to site, installation, testing and commissioning of a distribution network in the North-western area of Rwanda.

The overall scope of works under this project includes:

1. Route survey and profiling for Medium and Low Voltage distribution lines. This includes preparation of pole schedules, line route profiles, and cadastral survey plans to a scale of 1:2500, complete with location plans drawings prepared on maps with a scale of 1:50,000 in AutoCAD as well as Arch GIS software.
2. Checking of the system stability on all MV poles using the latest version PLS-CADD software and will submission the designs for approval (before procurement of poles) including: back file, Sheet view in drawing format ,Structures location and usage report, Section usage report, Sag-Tension report as well as Line summary report.
3. Confirmation of guaranteed Technical Data Sheets, material specifications and vendor drawings, procurement of poles, conductor, fittings, transformers, service cables and fittings required in order to establish the distribution system as specified.

4. Carry out manufacturing, pre-shipment inspections in accordance with approved Inspections & Testing Plan, perform sea worthy packing, shipment, clearing and forwarding at the port of destination, inland transportation and delivery to site of all materials and equipment required for the specified distribution system.
5. Carry out site preparation, pegging for the lines in accordance with the approved line design, excavation of foundations, and installation of poles and backfilling for the same in accordance with the technical specifications.
6. Carry out pole dressing, by installing all the fittings in accordance with the approved line design, and do stringing for the line in accordance with the approved sag and tension chart specific to the type of conductor used.
7. Carry out installation of transformers stations including distribution transformers, medium and low voltage protection devices, interconnecting wiring to the medium and low voltage networks, earthling systems, disconnections and other network equipment as specified.
8. Carry out installation of all cables as required under the scope of supply. This includes LV cables, service cables and take-off cables from substations or hydro stations to medium voltage lines.
9. Carry Out pre-commissioning tests and commission the completed distribution network in accordance with the specifications.
10. Carry out Operations & Maintenance Training for Employer's personnel as specified.
11. Prepare and Submit Operations & Maintenance Manuals as well as As-Built Documentation for the works. The documentation is to be submitted in Portable Document Format, AutoCAD as well as Arch GIS formats.
12. Remedy any defects occurring during the course of the Defects Liability Period (DLP) in accordance with the Contract.

1.2. Project Location

The Government of Rwanda received funds from the World Bank, to finance the construction of approximately **128.65**km of Medium Voltage (MV) and **225.4**km of Low Voltage (LV).

The project location is presented by the following **table 1**:

Table 1: Administrative entities projection location

District	Sector	Cells
Rubavu District	**Nyamyumba**	Kinigi
		Burushya
		Nyamiko
		Busoro
		Munanira
		Kiraga
	Kanama	Misabike
		Rusongati
		Kamuhoza
		Yungwe
		Karambo
		Nkomane
	Nyundo	Nyundo
		Mukondo

		Kavumu
		Gatovu
		Bahimba
		Kigarama
	Rugerero	Rushubi
		Kabirizi
		Gisa
	Nyakiriba	Kanyefurwe
Burera District	**Nemba**	Nyamugali
		Kivumu
		Rubona
		Rushara
	Rugengabari	Nyanamo
		Rukandabyuma
	Ruhunde	Gaseke
		Gitovu
	Cyeru	Ndongozi
		Kabutare
	Rwerere	Ruconsho

		Rugali
	Rugarama	Cyahi
		Karangara
	Cyanika	Gasiza
	Kagogo	Kayenzi
		Kiringa
Rulindo District	**Base**	Rwamahwa
	Cyungo	Rwiri
Total	**15**	**41**

1.3 Objective of the ESMP

The objective of the assignment was to preparation a detailed ESMP to address the anticipated negative environmental and social project impacts of the project as well as their monitoring Plan. The plan prepared conformed to the requirements of the WB environmental and social policies, guidelines and assessment procedures in addition to those of Rwanda Environmental Management Authority (REMA).

1.4 Scope of the prepared plan

The scope of services undertaken by the Consultant included the preparation of the ESMP whose purpose was to define and reach an agreement with project sponsors concerning the following:

- Mitigation and enhancement programs
- Monitoring programs
- Consultations
- Complementary initiatives

- Responsibilities and institutional arrangements
- Estimated costs
- Implementation schedules and reporting

CHAP 2. ADMINISTRATIVE, INSTITUTIONAL POLICY AND REGULATORY FRAMEWORK

This chapter of the report describes the National institutional, legal and policy framework for environmental and social requirements in Rwanda, the relevant World Bank (WB) safeguards operational policies applicable to the project as well as the international laws and conventions that bear relevance to the implementation of this project.

2.1 National Legal, Regulatory and Policy Framework

2.1.1 Constitution of Rwanda

The constitution states that all citizens have the right of equal access to public service in accordance with their competence and abilities. In the Constitution of the Republic of Rwanda of June 4th, 2003 as amended to date, article 49 states that every citizen is entitled to a healthy and satisfying environment. The law determines the modalities for protecting, safeguarding and promoting the environment. Different policies and laws from the constitution, the Vision 2020, the PRSP and EDPRS and the National Decentralization Policy (the "Decentralization") take into account environmental aspects and are in accordance with international policy framework mentioned in earlier section (5.1)

The laws and regulations of Rwanda and their pertaining policies were reviewed to identify those relevant to the proposed development. These are Environmental Organic Law; The law governing Land; Energy Law; Forest law and Wetland Law.

2.1.2 Environmental Organic Law N° 04/2005

Article 70 states that the Ministerial order establishes the list of projects for which the public administration shall not warrant any authorization without an EIA describing direct and indirect consequences of the project to the environment.

Furthermore, the law sets out the general legal framework for environment protection and management in Rwanda. The law determines the modalities of protecting, conserving and promoting the environment. Chapter IV of the Organic Law Article 67 clearly calls for the need to subject projects to mandatory Environmental Impact Assessment (EIA). Article 65 further specifies that every project shall be subjected to EIA prior to its commencement. Strategic Environmental Assessment (SEA) shall be subjected for programs, plans and policies (PPP) before obtaining authorization for implementation. It thus implies that environmental assessment would have a broader scope than the project-based EIA and provides a legal provision for a SEA instrument. Specific details of projects referred to in this Article are spelt out by the order of the Minister in charge of environment (**Laws N° 003/2008** and **N°004/2008** of August 15th, 2008). EIA shall be carried out at the expense of the promoter.

2.1.3 Organic Law governing land in Rwanda N° 03/2013

Article 3 of this law stipulates that land is part of the public domain of all Rwandans; ancestors, present and future generations.

With exceptions of the rights given to people, the state has supreme powers to manage all the national land. This is done in the public interest aimed at sustainable, economic development and social welfare, in accordance with procedures provided for by law. In that regard, it is the state that guarantees the right to own and use the land. The state also has rights to expropriation due to public interest, settlement and general land management through procedures provided by law and after appropriate compensation.

Article 4 requires 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 Articles 5 and 6. Any discrimination either based on sex or origin in matters relating to ownership or possession of rights over the land is prohibited. The wife and the husband have equal rights over the land.

Under Article 7, the rights over the land acquired from custom and the rights acquired from written law are equally protected. According to the law, all owners of land acquired from custom (persons who inherited the land from their parents), those who acquired it from competent authorities or those

who acquired it through any other means recognized by national custom whether purchase, gift or exchange have rights over the land.

Land ownership is divided into the following categories: individual owned lands and State lands (whether urban or rural). Individual land is comprised of land acquired through custom, written law, acquisition from competent authorities, purchase, gift, exchange and sharing (Article 11).

Land in Rwanda is categorized into two categories: individual Land and public land (Articles 12 and 13). The latter is subdivided into two categories: the state land in the public domain and the state land in the private domain. State land in the public domain includes national land reserves for environment conservation; land over which administration building are erected, state roads, and land containing lakes, rivers, stream and springs. State land in the private domain includes swamps that may be productive in terms of agriculture, vacant land with no owner, land purchased by the state, donations, land acquired through expropriation and land occupied by state-owned forests.

2.1.4. Vision 2020 and EDPRS 2

Vision 2020 ensures social and economic transformation while addressing environmental and natural resource management. Environment protection and management rank among the main pillars of vision 2020. To this effect, every individual including the corporate world should make efforts in ventures that will bring sound development aimed at improving Rwanda's per capital GDP.

In the EDPRS 2, infrastructure and energy sector plays a crucial role. Although national development is desired, any such development should be done in a sustainable manner as provided for in Rwanda's Environmental Policy. The Strategy highlights the environment priorities as major issues and has made efforts to focus on the environment and all key sectors that have at least one environmental indicator among their key performance indicators.

By 2020, the Government intends to have built a nation where pressure on natural resources mainly lands, water, biomass; biodiversity will have reasonably been decreased and the pollution process and environmental degradation reversed. As such, it acknowledges the interdependencies and complementarities between different policies and developments.

2.1.5 Expropriation Law N°32/2015

The law determines the modalities and the procedures relating to expropriation in the public interest. It states that only the Government shall carry out expropriation. Expropriation as provided for in this law shall be carried out only in the public interest and with prior and just compensation. Every project, at any level, which intends to carry out acts of expropriation in the public interest, shall provide funds for inventory of assets of the person to be expropriated and for just compensation on its budget.

Article 3 stipulates that expropriation can only be carried out by the Certified Value and only in the public interest and with prior fair and just compensation. Underground or surface activity may be carried out with a public interest aim, on land belonging to a person. No landowner is permitted to oppose such activity. In the event that the activity causes any loss to the landowner, he shall receive fair and just compensation for it.

Article 12 stipulates that the relevant Land Commission, after receiving the request for expropriation, shall examine the basis of that project proposal. In case it approves the basis of the project proposal, the relevant Land Commission shall request, in writing, the District authorities concerned to convene a consultative meeting of the population where the land is located, at least within a period of thirty (30) days after receipt of the application for expropriation, and indicating the date, time and the venue where the meeting is to be held. The relevant Land Commission shall take a decision within a period of at least fifteen (15) days after the consultative meeting with the population.

Article 17 stipulates that a person or representatives to be expropriated shall be informed in the presence of representatives of the local administrative entities of the beginning of the process of the land survey and the inventory of the properties thereon. The owner of the land is not allowed to carry out any activities after the land survey and the inventory of the properties. In case the beneficiary carries out any activities, they shall not be valued in the process of expropriation. In case the owner of the activity who was informed through procedures provided by this law does not appear, a report shall

be made and signed by the representatives of the local administrative entities as well as those who conducted the survey and the inventory.

Article 18 stipulates that the person who owns land intended for public interest shall provide evidence of ownership of the land and certificate of acknowledgment of the members of his/her family. The evidence shall specify in which conditions the land was acquired and shall include a document or statement of local administrative entities indicating rights of the expropriated person on the land; a document of witnesses; or a Court certificate. The person who occupied reserved land after the publication of relevant laws shall not be entitled to any compensation.

According to Article 21, the properties to be valued for just compensation due to expropriation include land and activities that were carried out on the land including different crops, forests, any buildings or any other activity aimed at efficient use of land or its productivity. The value of land and the activities thereon that belong to the person expropriated shall be calculated considering their size, nature and location and considering the prevailing market prices.

Article 23 provides that through agreement between the person to expropriate and the one to be expropriated, the just and fair compensation may be monetary or an alternative land and a building equivalent to the determination of just monetary compensation. In order for the expropriation to be implemented, the just compensation shall be awarded to the expropriated person before he or she relocates.

Article 24 stipulates that the timeframe for compensation shall not exceed one hundred and twenty (120) days from the day of approval of the compensation. Subsequent to receiving just compensation, the expropriated person has a period that does not exceed ninety (90) days, in order to relocate or to cultivate and harvest crops within that period. Forceful relocation is permitted where a person receives an award and refuses to relocate. Competent authorities shall supervise such relocation. In case the expropriator does not pay the agreed just compensation on time as provided by Article 24, he or she shall pay an annual interest on delays of 5% in addition to the just compensation agreed or awarded to the expropriated person. Such a period shall not exceed two (2) years.

According to Article 25, compensation payment transactions shall be made through banks or any financial institution recognised by law and of his or her own choice in the country. In case of compensation, rights on the property as a family or as a legally married spouse shall be applied and the money shall be deposited on a joint account and any withdraw shall be done with consent of account owners.

2.2. Institutional framework

2.2.1 Ministry of Infrastructure

The main institutions in electricity supply for Rwanda is the Ministry of Infrastructures (MININFRA). MININFRA is responsible for policy development, advisory and monitoring. It is responsible for setting policies related to energy; urbanization and settlements; road and communication infrastructure and Water supply. MININFRA ensures the infrastructures developments that protect fragile ecosystems where development projects may destroy natural habitat are being implemented. 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. It also ensures the proper use, management and rehabilitation of all public infrastructures and other related.

2.2.2 Rwanda Energy Group (REG).

The Rwanda Energy Group Limited (REG Limited) and its two subsidiaries; The Energy Utility Corporation Limited (EUCL) and The Energy Development Corporation Limited (EDCL) entrusted with energy development and utility service delivery.

The Rwanda Energy Group Limited was incorporated to expand, maintain and operate the energy infrastructure in the Country through its two subsidiaries the Energy Utility Corporation Limited (EUCL) and the Energy Development Corporation Limited (EDCL).

It has to ensure focused attention to enhancing efficiency in utility operations on one hand and ensure more timely and cost efficient implementation of development projects on the other. Moreover, the REG holding structure provides the overall coordination and ensures effective development of energy and investment plans. REG ensures the effective implementation of Government policies, monitoring

the execution of strategic plans; improvement of service delivery and effective project execution by the subsidiaries. It also plays a coordination role to ensure the smooth interrelationships of the two subsidiaries.

a. Energy Development Corporation Limited (EDCL).

The Energy Development Corporation Limited (EDCL) was incorporated to have devoted attention to increasing investment in development of new energy generation projects in a timely and cost efficient manner to expand supply in line with EDPRS and other national targets. It has also to develop appropriate transmission infrastructure to evacuate new plants and deliver energy to relevant distribution nodes. Planning and execution of energy access projects to meet the national access targets is at its central point of attention. This ring-fenced approach to development is designed to enhance accountability of development resources with the various stakeholders while at the same time opening space for increased private sector participation.

b. The Energy Utility Corporation Limited (EUCL)

The Energy Utility Corporation Limited (EUCL) was incorporated to have devoted attention in providing energy utility services in the Country through operations and maintenance of existing generation plants, transmission and distribution network and retail of electricity to end-users. The EUCL has to ensure the following as part of ensuring the proper running and development of the energy sector and related initiatives:

- Optimized generation capacity and economic plant dispatch to meet short and long-term energy supply requirements,
- Enhanced operational efficiency (progressive system loss reduction, billing and collection efficiency, network reliability and high quality of service),
- Improved customer service, and
- Network growth and increased connections within the footprint of electrified areas thereby making an effective contribution to the EDPRS targets.

The Company has four main processes feeding into the core business; Policies planning, Marketing planning and development, Distribution planning and development within already electrified areas and Operation & Maintenance of Power Plants and Transmission & Distribution Networks owned by the Utility.

The utility will also play a key role in the execution of Power Purchase/Power Sales Agreements with IPPS and other regional utilities for import and export.

2.2.3 Rwanda Housing Authority (RHA)

Rwanda Housing Authority agency under the ministry of infrastructure, legally established in order to organize the construction industry as a whole and by doing so to spur Economic Development and Poverty Reduction which guide Rwanda's medium-term development. Rwanda Housing Authority has to ensure the implementation the National Housing, Urbanization, construction and Government Assets management policies through coordination, conception, development, monitoring and evaluation of actions and programs set out in its mission.

Its specific objective is to ensure adequate institutional, legal and regulatory framework (including capacity building), increase the volume of infrastructure and equipment, ensure quality of services, minimize and stabilize costs, increase accessibility, ensure continuity/durability, and ensure safety in housing infrastructure for its user/beneficiaries. Majors of its functions which are regulate the housing, legislation, construction, urban development industries and management of government assets both fixed and non-fixed assets and also to develop a reliable database that encompass land use/management ,housing and construction.

The Rwanda Housing Authority developed Urban Planning Code and Rwanda Building that provides urban planning principles that include criteria of defining urban centers, basic public infrastructures, objectives and requirements of site development and land subdivision, plot restructuring and re-plotting, plot development parameters based on zoning principles, categorization of urban land use, neighborhood design principles, traffic circulation principles, etc. These guide the setting of electricity networks in order to ensure the effective use of energy resources available in Rwanda and sustainably use available resources urban and rural areas electrification.

2.2.4 Ministry of Environment (MINOE)

Ministry of Environment is responsible for addressing issues of policy, in particular through Ministerial orders and/or orders that set out laws and procedures for the administration, planning and allocation of land. It governs the implementation and application of organic law and land use master plan. It puts in place mechanism for the sustainable management of natural resources in conformity with the national priorities set by the national development pillars (Vision 2020, EDPRS II, and MDGs).

2.2.5 Rwanda Natural Resources Authority (RNRA)

RNRA is an authority that leads the management of promotion of natural resources which is composed of land, water, forests, mines and geology departments. It is entrusted with supervision, monitoring and to ensure the implementation of issues relating to the promotion and protection of natural resources in programs and activities of all national institutions. It is particularly responsible for the enforcement of all national laws and international conventions/treaties ratifies Rwanda on matters related to the conservation of natural resources. Its mandate also goes to the government technical advisory in different matters related to natural resources sustainable use and ensuring good collaborations with stakeholders in natural resources at all levels. It plays also a valuable role in natural resources inventories, registration and records keeping for their proper uses and planning.

2.2.6 Rwanda Environmental Management Authority (REMA)

REMA is non-sectorial institution mandated to facilitate coordination and oversight of the implementation of national environmental policy and the subsequent legislation. REMA has a key role to play towards the achievement of the national goal of sustainable development as set in out in the National Development Vision 2020. The alarming rate of environmental destruction as a result of population pressure, serious erosion, pressure on natural resources, massive deforestation, pollution in its various forms etc. necessitated the Government, to form REMA to coordinate, supervise and regulate environmental management for sustainable development in Rwanda. With regards to the management of the bio-physical environment throughout Rwanda, the overall responsibility now lies

with the Rwanda Environment Management Authority. In November 2003, the Government of Rwanda approved the law establishing the Rwanda Environment Management Authority (REMA).

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 programs; to coordinate implementation of Government policies 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

2.2.7 Rwanda Utilities Regulatory Authority (RURA)

Rwanda Utilities Regulatory Authority (RURA) is a national institution established by the Law N°39/2001 of 13/09/2001 for the Regulation of Certain Public Utilities.

RURA has a legal personality and autonomy in the management of its finances, assets and employees and has its own official seal and Regulates; RURA has a legal personality and autonomy in the management of its finances, assets and employees and has its own official seal and regulates;

The public utilities regulated by RURA are Energy, Telecommunications, Water and Sanitation, and Transport.

The Legal Mandate under Energy

1. Ensure energy service provision throughout the country is meeting the demand;
2. To ensure that licensees have adequate means to finance their activities;
3. To promote the interest of users and potential users of services through effective competition;
4. Ensure Consumer protection;
5. Facilitate and encourage private sector participation in investments by setting up conditions enabling electric power investments;
6. Ensure compliance by public utilities with the laws;

2.2.8. Governance and Decentralization framework in Rwanda

The Republic of Rwanda is divided into 4 provinces plus Kigali City, (Eastern, Western, North and Southern Provinces) which are further divided into districts (there are 30 districts), which are further divided into 416 Sectors and the Sectors are divided into cells. The cells are subdivided into villages commonly known as "Imidugudu" and are the smallest administrative bodies and the closest to the local communities. The District is an autonomous administrative structure with a legal status and financial autonomy.

2.3. INTERNATIONAL LEGAL FRAMEWORK

Rwanda has ratified and signed a number of international conventions and protocols on or related to environment and has taken further steps to confirm his commitment in the area of environmental and natural resources management. Rwanda is an active participant in major international multilateral conventions relating to environmental governance, most notably the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the Convention to Combat Desertification and Drought (UNCDD) and the international policy framework such as the MDG.

Table 2: International conventions and protocols

Conventions and Treaties	**Date of signature**	**Approved by law and date signed/ratified by GoR**
International convention on biological diversity and its habitat signed in RIO DE JANEIRO in BRAZIL	June 5th, 1992	Presidential Order N° 017/01 of March 18th, 1995
United Nations framework convention on climate change signed in RIO DE JANEIRO in BRAZIL	June 5th, 1992	Presidential Order N° 021/01of May 30th, 1995
STOCKHOLM convention on persistent	May 22nd, 2001	Presidential Order No

Conventions and Treaties	**Date of signature**	**Approved by law and date signed/ratified by GoR**
organic pollutants		78/01 of July 8th, 2002
BASEL convention on the control of trans-boundary movements of hazardous wastes and their disposal	May 22nd, 1989	Presidential Order No 29/01 of August 24th, 2003
ROTTERDAM international convention on the establishment of international procedures agreed by states on commercial transactions of agricultural pesticides and other poisonous products	September 11th, 1998	Presidential Order No 28/01 of August 24th, 2003
MONTREAL international convention on substances that deplete the ozone layer	1997	Presidential Order No 30/01 of August 24th, 2003
CARTAGENA protocol on bio-safety to the convention of biological biodiversity signed in NAIROBI and NEW YORK	Nairobi May 15th to 26th, 2000 and New York from June 5th, 2000 to June 4th, 2001	Law No38/2003 of December 29th, 2003
KYOTO protocol to the framework convention on climate change	March 6th, 1998	Law No 36/2003 of December 29th, 2003
RAMSAR international convention on wetlands of international importance, especially as waterfowl habitats	February 2nd,1971	Law No 37/2003 of December 29th, 2003
BONN convention on conservation of migratory species of wild animals	June 23rd, 1979	Law No 35/2003 of December 29th, 2003
Washington agreement on international trade in endangered species of wild flora and fauna	March 3rd, 1973	Presidential Order No 211 of June 25th, 1980

Conventions and Treaties	Date of signature	Approved by law and date signed/ratified by GoR
African Agreement on the Nature Conservation and Natural Resources	15/09/1968	20/05/1975

Table 2: International conventions and protocols

3. ENVIRONMENTAL POLICIES AND LEGISLATIVE FRAMEWORK

This ESMP has been prepared to fully comply with environmental legislations and procedures in Rwanda and with the WB environmental and social safeguard policies.

In this chapter, the key safeguard policies that provide the policy context to the ESMP includes WB legal requirements on environmental assessment have been outlined.

3.1. WORLD BANK ENVIRONMENTAL AND SOCIAL SAFEGUARDS POLICIES

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 "do no harm". These safeguard policies are grouped into Environment and Rural Development, Social Development and International Law.

OP/BP 4.01 Environmental Assessment (January 1999).

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

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

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

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

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

OP/BP 4.04 Natural Habitats (June 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.

OP/BP 4.11 Physical Cultural Resource (July 2006)

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

OP 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 natural 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".

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, or Participate in planning and implementation of resettlement programs, and to 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 riparians 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 riparians 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.

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.

As per the nature of the present project and the category it classified to, the Environmental Assessment (OP/BP 4.01) and Involuntary Resettlement (OP/BP 4.12) bank procedures are triggered and the requirement of an ESMP and an ARAP is herewith considered prior to the implementation with compliance of bank safeguards requirements.

World Bank Environmental Management Plan Guidelines

WB places strong emphasis on the preparation of EMPs during project processing and on setting out conditions and targets to be met during project implementation. The terms of reference for an ESIA thus require the Borrower or their consultants to prepare an ESMP as a major output of the

environmental and social assessment. Where appropriate, the key contents of EMPs are incorporated into the loan agreement, for implementation and monitoring by the Borrower.

WB requires that an EMP be included as part of the EIAs and IEEs (for Category B projects deemed environmentally sensitive). The EMP is carefully reviewed to ensure environmental safeguard compliance prior to the first MRM. However, at this stage in the project cycle, the specific construction and operational activities may not be well defined. And often it is not possible or practical to provide the details required for an effective EMP. Thus. the WB requires that the Borrower ensure that a revised EMP be prepared at the beginning of the implementation stage. The contents of complete ESMP are:

1. Summary of Potential Impacts
2. Description of Planned Mitigation Measures
3. Description of Planned Environmental Monitoring
4. Description of Planned Public Consultation Process
5. Description of the Responsibilities and Authorities for Implementation of Mitigation Measures and Monitoring Requirements
6. Description of Responsibilities for Reporting and Review
7. Work Plan including staffing chart, proposed schedules of participation by various members of the project team, and activities and inputs of various government agencies
8. Environmental Responsible Procurement Plan
9. Detailed Cost Estimates

3.2 Relevant International Conventions and Treaties in relation with safeguards

Rwanda is signatory to several international conventions and treaties that would need to be adhered to, in implementing this project. Some of these includes and not limited to:

- Convention on Wetlands or the Ramsar Convention
- Convention on Biodiversity
- Convention on the Conservation of Migratory Species
- United Nations Framework Convention on Climate Change
- United Nations Convention to Combat Desertification
- Protected Areas for international Importance

4.0 METHODOLOGY

4.1 Approach

To enrich this review and ensure optimal participation of all the stakeholders, a participatory and collaborative approach was adopted. Emphasis was put on consultations between, EDCL/EARP/RESSP, the communities and other stakeholders Log Associates concisely described the project and its geographic, ecological and general layout of facilities. Additional information on size and capacity of pre-construction activities, construction activities, schedule, support, material/facilities and services and operation and maintenance activities were also taken into account. In addition to environmental and social impacts of the project were identified with subsequent mitigation measures.

4.2 Methodology

4.2.1 Desk Review

The consultant reviewed the following documents as part of this review:

- ✓ European Investment Bank/European Union checklists,
- ✓ World Bank (WB) Guidelines,
- ✓ World Bank (WB) and IFC Environmental Guidelines on Projects and ESIA/ESMP Studies
- ✓ Environmental Management and Coordination Act 1999,
- ✓ REMA Environmental Guidelines
- ✓ The Occupational Safety and Health Guidelines
- ✓ Rwanda Electricity Grid Code
- ✓ Electricity reticulation standards
- ✓ The National Public Health policy
- ✓ The Constitution of Rwanda,2003 as revised to date
- ✓ The Environmental (Impact Assessment and Audit) Regulations, 2006
- ✓ Organic Law relating to the environmental protection and Management, 2004
- ✓ Rwanda Land law, 2004

- ✓ Rwanda construction standards, 2008
- ✓ District Development Plans for Rulindo, Burera and Rubavu Districts

4.2.2 Public Consultation Forum

The consultant organized and convened a public consultation meeting between;

a) Communities- To convey the consultation theme

b) EDCL/EARP/RESSP & Lucky export Representatives and sub-contractors

c) Individuals- Project Affected Persons (PAPs)

d) Other Stakeholders i.e. • District/ Sector administration entities

CHAP 3. BRIEF ENVIRONMENTAL AND SOCIAL CHARACTERISTICS OF THE PROJECT AREA

This chapter gives background information of the project area as a whole then narrows down to project specific site in terms of its location, administrative set-up, climate, settlement patterns, and the major environment attributes, which will play a crucial role in the identification of impacts and influence the overall direction in the development of the project.

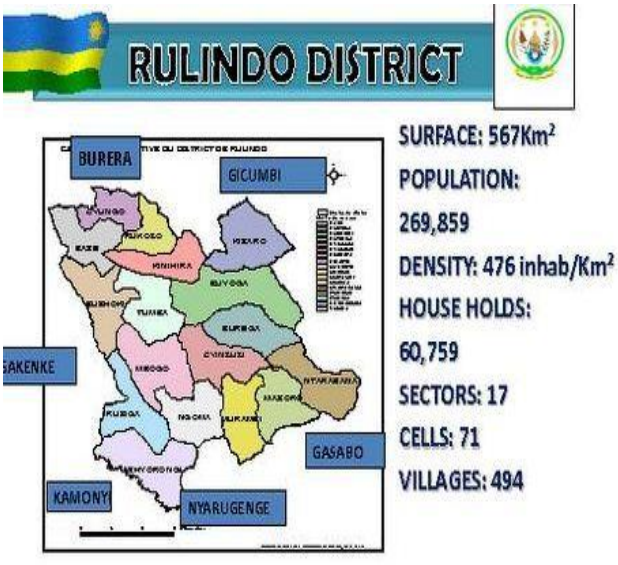
The North-Western area of Rwanda is a highly favored destination for tourists. It boasts a collection of dormant volcanoes towering over the already highly elevated rolling hills (though, they seem like mountains themselves) and beautiful bitches around Kivu Lake in Rubavu district.
Mountain gorillas, an endangered species, can only be found in this region of the world, with Rwanda being the safest and most convenient country for seeing these majestic creatures in their natural habitats.

The North-West is also known for its rain, in and out of the rainy season. To the north is the border with Uganda and directly west is the Democratic Republic of the Congo. Rubavu, a popular resort town, lays on the northern point of Lake Kivu- a most relaxing getaway.

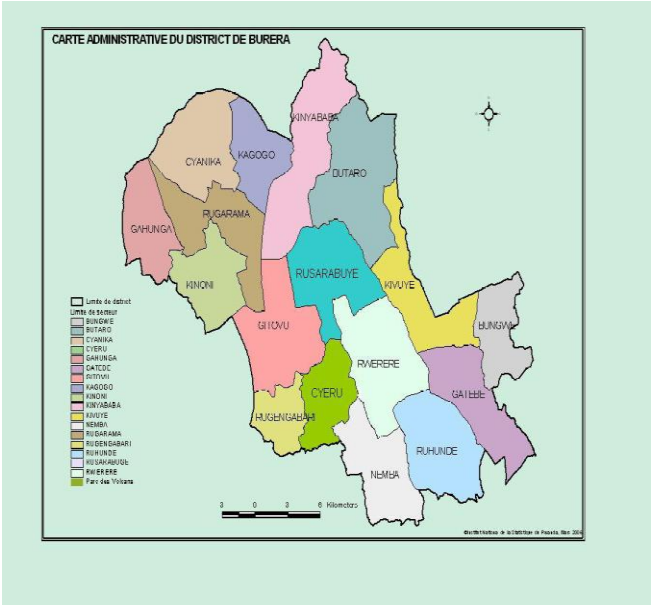
3.1. Project Location

The project sub-activities are located in the North-western zone including the following districts Rulindo and Burera of Northern Province and Rubavu District of Western Provinces of Rwanda. Further details are described in table 2 and as per below maps:

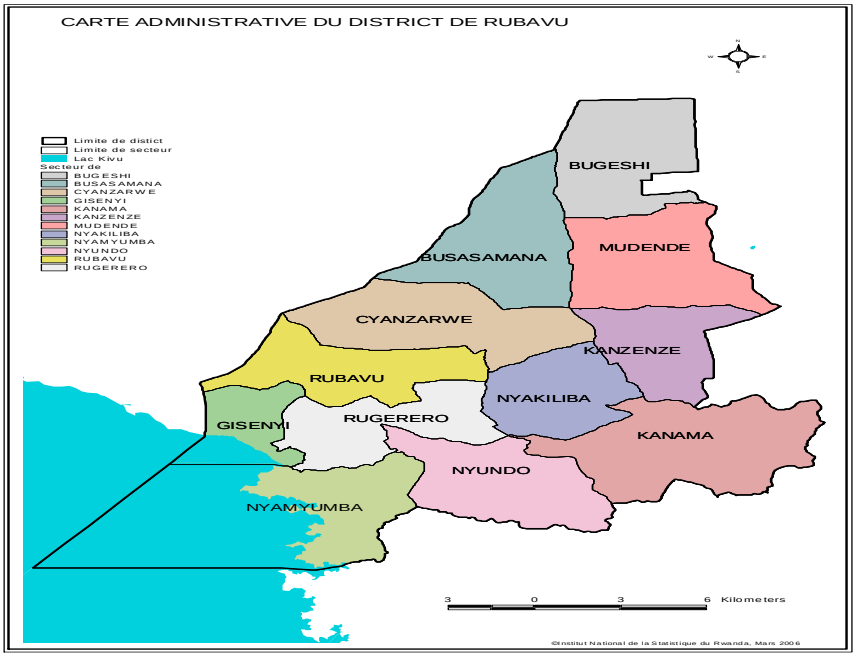
Figure 1: maps of project location per districts and sectors



Rulindo District Administrative Map



Burera District Administrative Map



Rubavu District Administrative Map

The North-West region to be electrified has the area of 3,276 km2 (1,265 sq. mi) with total population of 1,726,370 at the density of 530/km^2 (1,400/sq. mi)

3.2. Location and geographic data.

The North-Western zone includes the following limits:

- North: From West to East, the zone respectively bounded by Burera and Musanze Districts and Kabare District (Uganda side) sharing the Rwandan-Ugandan border and the districts ofNyagatare and Rwamagana in the East.

-In the East: From North to South, the zone is limited by the districts of Kigali City plus parts of Kamonyi and Muhanga Districts of Southern Province.

- In the South: from East to West, the zone has the border with Rwamagana and Gasabo districts

-To the West: the North-Western zone is limited by Rutsiro and Karongi Districts.

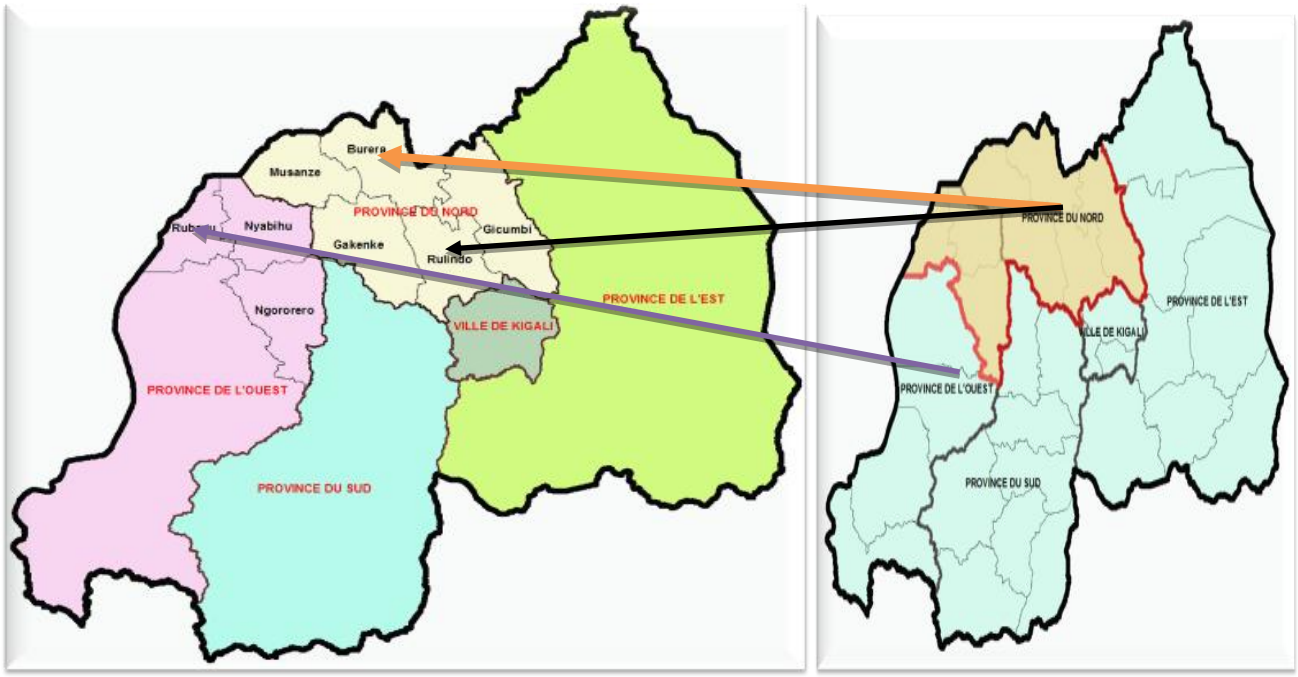


Figure 2: North-Western part of Project intervention areas (Rulindo, Burera&Rubavu Districts)

3.3. Relief.

The relief of the North-west of the Province (Rulindo-Burera -Rubavu) area is very rugged with steep slopes where the altitude culminates at2500meters.The valleys are deep and narrow. To the East, there are rather plains with altitudes ranging between 1500 and 1800meters, land degraded heavily by rain erosion.

The Northern zone has a potential climate wetted form the east to the west where we find volcanic areas and the long lasting Congo Nile Trail in the Northern -western side of the area.

Photo: The landscape of Musanze District

3.4. Hydrography.

The major rivers in the area are: Mukungwa, Rugezi, Base, Mwange, Mulindi; Muturirwa, Walufu and Bulimba. Northern zone of Rwanda has also some water supplies scattered here and there and likely to provide hydro-electrical power. The flow of these rivers and supply systems varies seasonally. Despite this abundance of water sources, the region's population suffers from drinking water shortage, since most of these sources are in the lowlands (valleys) while the population prefers to live in the slopes and hilltops. Thus, conveyance of water by gravity is not possible and the installation of the pumps is expensive.

The whole rivers system of the North-Western region belongs to the Nile Basin. The density of the network is important in the West, the regime is torrential and rivers are often cut off from falls or rapids that can produce electrical energy. Several rivers and streams can have flooding during the rainy season and abruptly fall during the dry season, hence the difficulty to know exactly their flows.

It has a large marsh with plenty of water. Exploitation for agricultural purposes is prohibited so as not to deplete water of Burera and Ruhondo lakes and large marsh of Mukungwa and Rugezi wetlands. Despite all this rich hydro potential, the area lacks drinking water. People live in the tops of the hills yet the water sources are in the shallow valleys.

Because of the very rugged terrain, the piped water by gravity is rare. Water supply by pumping is very expensive and difficult to maintain.

3.5. Climate.

The climate of the Northern Province alternates between dry and rainy seasons with winds from the tropics and the monsoon from the Indian Ocean and Lake Victoria. The area of the eastern district enjoys a temperate climate with an equatorial average annual temperature of 20°C. In the region of high altitude, the annual average temperature oscillates between 11°C and 15°C. Towards the altitudes of 2000 meters, the climate is cold and wet.

In general, rainfall is abundant but irregular, sometimes improvised during the dry season. There are

often major landslides during the long rainy season. In the mountainous area in the western part of Rulindo district, the rainfall exceeds 1200mm per year whereas the average is 950mm per year in the East.

3.6. Soils.

Overall, the soils of the project area are the volcanic and kaolin soils which are dominated by shales, the mica, the quartz and volcanic soils in North -west. They are acidic (pH around 5) and have a high content of clay, well developed topsoil and an acceptable level of exchangeable bases.

- The group of kaolin dominates quartz and shales with a high content of clay;
- Soils derived from shales in fine silt with high water retention;

The ferric-soils rest on a lateritic layer of varying thickness from which agricultural value depends on the state of conservation of the humus layer which is often very low, their vocation is often forestry and pastoral;

- ❖ The ferric-soils and litho-soils on quartz rich in gravel and stones
- ❖ The very stony soils on quartz for the sole purpose of forestry;
- ❖ Organic soils of valleys with high agricultural potential but with very indispensable drainage,

In all kaolin-soils, the ferric-soils have the high potential fertility provided that anti-erosion measures required by the very rugged terrain, save their humus layer. In general, soil productivity of Burera decreases year by year due to rainfall erosion caused by terrain and as a result of the over-exploitation of land due to population pressure and lack of organic manure.

3.7. Agro-climatic zones.

According to the classification of agro-bio-climatic of Rwanda (Agricultural Agenda 2011, soil map), the district of Gicumbi belongs to three agro-climatic zones:

- In its north-south axis, from Burera to Rulindo district is in the area of the highlands of Buberuka characterized by a very hectic terrain, a succession of steep hills separated by

valleys, a high altitude varying from1 800 to 2650 meters, rainfall varies from 1 200 to1 564mm, an average annual temperature of 15-16°C and land degraded by rain erosion.

- And finally, in its western part, covering a of big part of Nyabihu and Ngororero Districts of the western province of Rwanda bordering with Kamonyi District and Muhanga of Southern zone of Rwanda, is the area of the Central Plateau characterized by an interim relief, an altitude from 1 600 to 1 800 meters, an average annual rainfall of 1200 to 1 400 mm and an average temperature of about 22 ° C.

CHAP 4 ENVIRONMENTAL IMPACTS ANALYSIS AND MITIGATION MEASURES

The sub-project being a national development agenda in the energy sector has immense benefits that could save the country losses in terms of power rationing and frequent outages. However poor planning of the sub-project could also affect the environment that supports millions of Rwandese through the project potential hazards that the project could pose to the public, pollution of water resources and atmospheric resources.

Impacts are distributed in all project phases (Pre-construction, construction and post construction/operational phases as summarized in chapter 9 and 10 of this plan.

4.1 Positive Impacts

Positive impacts of these project are various and diverse in nature. They range from employment opportunities, to wealth creation, industrialization, improvement in service delivery to technology transfer and capacity building.

1) Employment Opportunities

Employment opportunities will be offered to the construction workers and any other person who will be hired to provide her/his services during the construction phase. The project is envisaged to create approximately 400 jobs during construction phase (12 months).

2) Additional Power Capacity

With the additional substations and power lines, EDCL will be able to increase its electric power reliability and power supply capacity. This additional capacity would have a positive impact on the increasing power demands across the areas, in terms of economic empowerment, because EDCL/EARP/RESSP would be able to supply more electric power. The electricity access scale-up as the key objective to achieve will be strengthened.

3) Socio-economic Benefits

The positive impacts are numerous and wide-ranging. The benefits of the project for domestic supply and use in small-scale businesses and in access to electric power for schools and public services are evident. In the construction phase there will be temporary employment opportunities for local contractors and those who will be employed or supply services and provisions for workers and to contractors.

Within the respective project areas there will be opportunities for petty trading and small business service provision along the power line routes.

Significant social benefit will come through employment generation and safer more efficient operation of key services, through provision of electricity access to the villages along the distribution lines served by the project.

Potential beneficiary enterprises affected by and contributing to regional socio-economic transformation will be small industries and other agricultural processing businesses which need electricity.

The long-term direct positive impact is therefore in access to reliable electricity supplies, which will lead to better provision and easier management of goods and services, and enable new facilities for processing and storage. There will be better availability and supply of safe and clean water (which needs pumping); data management with computers is made possible and communication facilities like Internet can be made available, as also charging for mobile phones; also, electric lighting adds to security at night and enables extended opportunities for work and study.

Electricity would support overall investment in education and strengthen the ongoing effort of capacity building to overcome critical constraints in the implementation of development program. Essential to this effort would be power supply to health facilities for the installation of cold storage facilities for the safe transportation and storage of vaccinations and other vital medications. As a consequence. the quality of life and extent of economic opportunity will be changed for the better. Social and environmental costs, not least in noise and air pollution, associated with existing generator usage will be reduced and there may be a more limited requirement for firewood cutting and

collection. On employment the project expects to employ local casual unskilled and skilled labour on-site.

This is exclusive of indirectly employed people who will provide support and related services including those trading in food stuff for the workers on site and construction personnel during the site preparation phase of the project. An estimated total of 200 laborers will be employed in this project over a period of 12 months.

At this point it the number of women workers or those directly affected by the Project/Firm who could be employed is unknown but EARP will advise that this group of persons be given priority.

4.2 . Adverse Impacts during Design/Planning and Construction phase

Adverse impacts of the proposed distribution network are those unintended effects of the project that have negative to sustainable development and the environment. The following adverse impacts are anticipated to occur during the design/planning and construction phase of the project.

1) Permanent Land Loss/Acquisition

In order to construct the substations, create a new distribution network land will not be definitely have to be acquired for the "mini" substations, creating the new routes and Right of Way (ROW), only small portion of land less than 1m square will be used for single and H poles erection.

2) 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 minimize the number of new roads required, the impact is not expected to be significant.

3) Construction of Right of Way (ROW)

Possible interference with or fragmenting of land uses along the ROW, opening of remote lands to human activities such as settlement, agriculture and vegetation.

These effects can be significant if natural areas such as wetlands are affected. The routes identified are well established corridor for transport of goods and the cumulative effects from the Program will not be significant.

4) Construction of distribution lLines 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 distribution line is not expected to have a major adverse impact on land use patterns.

5) Land expected to be acquired

Only small land will be permanently lost to the tower bases. The farming of crops will be allowed to continue once poles construction is completed. Disruption to crop production will therefore be experienced for a period of one year only.

A compensation plan, detailed budget and implementation plan will be undertaken and included in the ARAP or RAP Reports which addresses both permanent and temporary loss of assets.

Mitigation Measures

Efforts have been made during the identification of the distribution line routes to ensure that the paths are routed in areas with minimal settlement as possible to avoid land acquisition or displacement. Structures along the identified routes and the PAPs will be compensated for the land to be and destroyed structures to pave way for the construction of the sub stations in accordance with appropriate expropriation and resettlement laws.

6) Establishing/Pegging Final Alignment of Transmission Line

The first site activities before mobilization of equipment will be final survey and soil investigations required for final design of line and tower foundations. After determining tower locations and before commencement of civil works the Contractor will make a terrain reconnaissance which may include rock drilling tests at each tower location. This provides a final opportunity to make minor realignments to the route to avoid any further environmental and social impacts.

7) Determination of Final Alignment at Survey and design Stages

- Avoid sitting distribution line through protected areas, other environmentally sensitive areas or through mature forest stands.
- Avoid cultural and heritage sites.
- Site distribution line poles on high points of land such that conductors can be strung over valleys thereby eliminating the need to remove trees.
- Locate distribution lines along the base of mountain slopes, rather than down the center of valleys where large birds could come into contact with conductors.
- Locate distribution lines to avoid running through villages and instead run lines behind villages.
- Consult villagers regarding location of valued village resources and locate distribution lines to avoid these features.
- Situate distribution lines not far away from roads, but behind roadside forested areas so as to minimize visual intrusion.
- Minimize the need to construct new access tracks wherever possible.
- Use existing access roads and tracks wherever available.
- Ensure minimum clearance distances between conductors and ground, waterways, road crossings, buildings, communication systems etc. are incorporated into design.

8) Permanent Minor Loss and Destruction of vegetation cover/crops

The route for the distribution lines are generally agricultural land where the following variety of crops including fruits and other trees: Avocado trees, Tomato, Pepper, Orange trees, Mango trees, Grevillea*spp* , Ficus*spp* trees, Eucalyptus *spp*, Euphorbia Trees, Flowers, Cassava, Euphorbia live fences, Maracuja, Cactus tree, Lemon trees, Papaya trees, etc are present and planted countrywide. These crops and trees will inevitably have to be removed to pave way for the construction of the distribution lines, transformers installation and creating the Right of Way. However, the area required for each tower and ROW for the distribution line is not expected to have a major adverse impact on land use patterns.

Mitigation Measures

This impact is unavoidable and the crops destroyed will be compensated at full market value before any construction works commence. The compensation and resettlement process will be prepared for approval by the bank and REG/EUCL/EARP.

- Limit ROW to 12m width, however, the undergrowth in the ROW should be allowed while only leaving a narrow strip to be completely cleared to allow stringing of the line conductors.
- Strictly define ROW clearing activities in the contract specifications and in the Environmental Management Plan (EMP).
- String conductors under tension to minimize potential damage to remaining ground vegetation.

9) Disruption in Daily Living and Movement Patterns

It is anticipated that the construction activities will result in some intrusions and disruptions in the daily living and movement patterns of the property owners.

Such disruptions are anticipated to be of high significance, but of a short-term nature, and could be caused by the movement of construction vehicles and frequent entries to the properties as a result of the construction activities.

Mitigation Measures

The negative social impacts on the living and movement patterns of the property owners during the operation phase of the project are anticipated to be of low significance and of a short duration, as maintenance of the distribution lines would not be undertaken on a daily basis.

10) Aesthetics and visual related impacts- visual intrusion on the landscape

Construction works especially when construction of MV and LV lines are likely to cause visual related impacts mainly by having activities out of touch with the natural environment in some cases.

The MV and LV lines are regarded as being the most visually intrusive component of transmission lines. It is anticipated that the construction of the proposed distribution lines will impose a visual impact on the immediate surrounding area.

Mitigation Measures

The frame-like structure of the distribution line presents a low degree of view obstruction as a result of it not being a solid structure, and allows for blending with background colour/patterns of most landscapes.

11) Water Resources

The construction of MV and LV lines may interfere with the natural drainage systems and modify flow of surface water, and these changes can contribute to soil erosion, flooding, channel modification, downstream scouring and sedimentation in streams and other drainage channels.

The contractor should concern to keep areas of lower elevation as far as possible, in order to minimize the visual impacts associated with the proposed distribution lines.

12) Disruption of Infrastructure and Services

Without the implementation of appropriate management measures, general services (such as underground pipes, existing distribution lines) could be damaged during the construction period. Any disruption in the services (especially in the local electricity supply should distribution lines be damaged) could potentially have a negative impact on local enterprises (e.g. businesses activities). The nature and extent of the impact will depend on the length of the interruption in general services. The contractor is expected to undertake the rehabilitation works and construction works sometimes in the vicinity of energized lines. This could lead to frequent power interruptions and black outs or even de-energization of lines.

Mitigation Measures

- The contractor should establish whether there is any infrastructure located near or inside the transmission lines servitude in order to avoid any damage to these during the construction phase.
- Discussions should be held with the relevant parties whose infrastructure could be negatively affected.
- The Local Authorities should be informed of the construction schedules to ensure the minimum disruption of such infrastructure.

- The contractor shall make sure that the Time Schedule provides for adequate advance notice to the Employer as to when shut-downs and/or partial de-energizing of existing equipment are required. The Contractor shall make provisions to be able to shift teams and equipment in order to continue work at other sites if the shut-down cannot be granted for the requested period at the requested dates. He shall be able to resume the works scheduled during shut-downs when they are granted, with a reasonable advance notice. The required interruptions shall be kept to a minimum in terms of length of the shut-down.

- Property owners and nearby communities should be informed well in advance of the construction schedule and any changes to this work schedule.
- Heavy vehicles should make use of the existing access roads on private properties as far as possible. In cases where private roads are to be used, this should be negotiated with the property owner before the construction period commences.
- Construction vehicles should keep to the speed limit and should avoid busy roads, as far as possible.
- Construction activities should not be undertaken after-hours or over weekends.
- Construction should preferably not take place during the harvesting season.
- Property owners should be informed when maintenance of the transmission lines will be undertaken on their properties.

13) Temporary /Limited Fugitive Dust and Noise

Noise resulting from access road and distribution line construction may disturb neighboring communities and local fauna. This impact will be of a temporary nature only and can be minimized by adopting appropriate mitigation measures including maintaining equipment and vehicles to manufacturers' standards and limiting operating times to daylight hours. Dust will be an issue during the construction of access roads and clearing of vegetation along the ROW, especially since it is recommended that construction take place during the dry season.

However, as most construction activities will be undertaken remote from residential areas, the impact is not expected to be major. Fugitive dust will be localized and may be emitted from construction works e.g., excavations and stock piles of materials including machinery as well as from truck traffic during the construction phase.

Dust impacts will be localized and experienced only in the specific areas where the excavation for tower installation and substation construction will occur. Vehicular movement on gravel roads could lead to dust pollution in some areas during dry conditions. This impact would be of a short duration during the construction phase. Dust pollution could also take place during maintenance and inspection of the lines. This impact will be localized and of a short duration, and is anticipated to be of low significance.

Mitigation Measures

- The dirt roads and exposed construction areas should be moisturized during the dry season to prevent or minimize the fugitive dust emissions.
- Proper location of material stockpiles, especially sand and soil downwind from the commercial, residential and other establishments will be required; Frequent wetting of the stockpile and working area; screening of or providing wind breaks for stockpiles;
- Workers in the project site must be equipped with the necessary and required Personal Protective Equipment (PPE) prescribed by the construction industry to mitigate dust impacts
- Routing of the lines should preferably not be in close proximity to residential dwellings.

- The construction schedule should be communicated with potentially affected parties.
- Construction timeframes should be discussed with property owners.
- Dust-suppression techniques should be used along gravel roads, when required.

14) Wildlife

There are no protected wildlife conservation areas along the alignments to be crossed, so there is likely to be only minor impacts on wildlife during the construction phase as a result of disturbance from movement of people and machinery and loss of habitat from the establishment of the 40m ROW along the length of the route. The proposed route passes mainly through a landscape that has already been greatly disturbed by mixed subsistence farming. Wildlife populations have already been severely impacted both in numbers and diversity.

15) Soil Erosion

During the construction phase, activities involving preparation, stripping, grading, soil removal, backfilling, compacting, disposal of surplus and excavation of the earth surface.

In addition to the loss of productive land due to soil erosion and land acquisition for MV and LV line construction, soils can be impacted as a result of disposal of waste materials, and compaction with heavy machinery used for the establishment of poles and the distribution line. .

These impacts can be managed by restricting the use of heavy machinery and vehicles to designated work areas and installing soil protection works in areas sensitive to erosion prior to construction.

Mitigation Measures

- To prevent soil erosion during site preparation, disturbed soils should be compacted immediately.
- Windblown erosion is to be prevented by soil compaction and wetting the ground to prevent rising of soil particles.
- The final site grade in the lines should include an adequate drainage channel that should facilitate drainage and avoid flooding and pooling. A site drainage plan should be developed

to protect against erosion. Protecting stockpiles through the use of silt fencing and reduced slope angles should be used to minimize soil erosion during construction.

- Design and construct distribution line routes with staggered legs so as to eliminate the need to excavate a level pad into slopes on which to construct lines.
- Clear only a narrow path to facilitate pulling the nylon rope between poles to string conductors.
-

16) Accidents/Hazards

As a result of the operation of equipment and machinery during construction, there is a likelihood of accidents occurring especially to the workers.

Mitigation Measures

- All workers need to be provided with the recognized and appropriate Personal Protective Equipment while at the construction site including gloves, dust masks, boots, goggles, and overalls among others.
- Only competent workers and staff should be allowed to operate any machinery and equipment to reduce the incidents of accidents.
- During the construction the project site should be completely sealed off and warning signs erected informing the general public to keep off the construction site when construction is in progress.
- Personal protection gear must be provided and its use made compulsory to all.

17) Storage and Management of solid waste

Solid waste materials during the construction include paper wrapping, scrap metal, excavated soils, polythene, plastic and metal will cause pollution and littering of the immediate and localized environment.

Mitigation Measures

- The contractor should engage a refuse handling company to remove the wastes from the site to the recommended dumping site.

- Warning signs against littering and dumping within the construction site should be erected by the contactor.
- Excavated top soil should be used as backfill by the contractor

4.3 Adverse Impact during Operation and Maintenance phase

The following adverse impacts are anticipated to occur during the operation and maintenance phase of the project. Two universal concerns about distribution line projects are (1) disposal of polychlorinated biphenyls (PCBs) once used in electrical equipment, and (2) possible health impacts of electromagnetic fields (EMF) associated with power distribution lines.

1) Polychlorinated biphenyls (PCBs) Impacts

PCBs used to be widely used as insulators in electrical equipment, including transformers, capacitors, switches, voltage regulators etc. They are of concern because they are powerful toxins, even at low concentrations, and they persist and bio-accumulate in the environment creating adverse health impacts and adverse ecological changes. Intentional PCB production was ended in most countries by 1980 and most transformers and capacitors built after 1980 do not contain PCBs. The major exception to this is transformers and other PCB applications produced since 1980 in the former Soviet Union.

The Basel Convention on Persistent Organic Pollutants lists PCBs as one of 12 target persistent organic pollutants requiring particular attention. This is also reflected in the WB EA Sourcebook update dealing with "Privatization and Environmental Assessment: Issues and Approaches" (March 1994). This states that the WB considers the use of PCB containing transformers a "red flag". Refurbishment of any substations for this Project will need to check whether any such old transformers/equipment will be replaced and appropriate safeguards taken. This is not an issue with new transformers, as they will not contain PCBs.

2) Health Effects of Electromagnetic Fields (EMF) Impacts

Electric and Magnetic Fields (EMF) are invisible lines of force that surround any electrical device. Power distribution lines, electrical wiring, and electrical equipment all produce EMF. There are many other sources of EMF as well. Electric fields are produced by voltage and increase in strength as the voltage increases. The electric field strength is measured in units of volts per meter (V/m). Magnetic fields result from the flow of current through wires or electrical devices and increase in strength as the current increases. Magnetic fields are measured in units of gauss (G) or tesla (T).

Most electrical equipment has to be turned on, i.e., current must be flowing, for a magnetic field to be produced. Electric fields are often present even when the equipment is switched off, as long as it remains connected to the source of electric power. In summary, voltage produces an electric field and current produces a magnetic field. The US National Institute of Environmental Health Services and the National Institutes of Health has prepared a comprehensive report on electric and magnetic fields associated with the use of electric power which is available on the World Wide Web at: *http://www.niehs.nih.gov/emfrapid.*

Electric fields are shielded or weakened by materials that conduct electricity—even materials that conduct poorly, including trees, buildings, and human skin. Magnetic fields, however, pass through most materials and are therefore more difficult to shield. However, both electric fields and magnetic fields decrease rapidly as the distance from the source increases. As a precautionary measure, EARP/EDCL has adopted internationally accepted standard ROW width of 40m along their high voltage transmission lines.

3) Accidents at work place from operating of machineries and equipment by workers

The potential for accidents and hazards occurring" during the operation of the equipment is a likely adverse impact that could lead to loss of life or injury to the workers.

- **Public Safety**

Placement of low slung lines or lines near human activity (e.g. highways, buildings) increases the risk for electrocutions. Also,

An Environmental, Health and safety officer, hired by the contractor, will have the authority or responsibility of keeping all members of the public away from the decommissioning zone, especially if members of the public choose to ignore posting signs or requests for them to keep some distance from the decommissioning zone. Some of the threats to public safety may include:

i. Dust Impacts:

Temporary and localized impacts from dust would occur from the decommissioning phase as a result of vehicular traffic, and other soil disturbances.

ii. Noise Impacts: Local noise levels will be affected temporarily by decommissioning activities (such as equipment movement), but for the remote nature of the sites no impacts are anticipated to residences or businesses. Impacts during decommissioning are expected to be limited to workers on-site.

iii. Fire and Oil Spill Prevention

Fire will be prevented during decommissioning by ensuring that there are adequate availability of fire extinguishers on site. The personnel undertaking the removal of the equipment will have to be trained on fire fighting and if possible, reasonable fire grills will have to be done to enhance awareness and safety.

In case of oil spills, all the equipment and machines that will have the potential of spilling or leaking oil will be checked regularly. If oil spills/leaks are discovered, then capping or any other necessary actions will be taken immediately to prevent the spill/leak from dropping onto the ground. However, careful handling will be done to avoid spilling at all times.

Mitigation Measures

- All workers entering the construction site must be equipped with PPE including goggles, factory boots, overalls, gloves, dust masks, among others. The PPE should be those that meeting the international standards of PPE.
- Personal protection gear will be provided and its use made compulsory to all. The entire workforce of the plant should be trained in the use of protective gear, handling of chemical products and acid storage cells, electric safety equipment, procedures for entering enclosed areas, fire protection and prevention, emergency response and care procedures.
- Training given to the employees should be backed by regular on- site training in safety measures.
- Machines and Equipment's must be operated only by qualified staff and a site supervisor should be on site at all times to ensure adherence.
- The contactor must develop workers' Health and Safety Manual for which all the workers should be conversant with for response in case of accidents.

➢ **Maintaining Access Roads**

The maintenance 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 minimize the number of new roads required, the impact is not expected to be significant.

Mitigation Measures

- Use existing access roads and tracks wherever available.
- Decommission and rehabilitate excess temporary access tracks as soon as they are no longer required.
- Where access is required across agricultural lands use temporary access paths during the dry season involving placement of geo-textile over aggregates where necessary.
- Minimize the need for access tracks whenever possible.

- Construction to proceed in the dry season if possible, to minimize soil erosion and mass wasting and to limit loss of crops (which are not grown in the dry season); where construction is required in the rainy season, potentially unstable slopes to be avoided.

➢ **Fire risk**

The risk of fire outbreaks during bad weather e.g. storms, winds etc cannot be overruled especially when the poles crash or if electrical faults occur. 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.

Mitigation Measures

- A robust fire prevention program and fire suppression system should be developed by the contactor for use in lines distribution.
- All of the site must contain firefighting equipment of recommended standards and in key strategic points. This should include at least, Carbon dioxide systems, Detection/alarm systems and portable fire extinguishers among others.
- A fire evacuation plan must be posted in various points of the cabins including procedures to take when a fire is reported.
- EDCL/EARP/RESSP should continuously ensure that the ROW is kept clear by regular trimming of trees and maintenance.

➢ **Solid Waste, Health and Safety Issues**

Solid Waste

There will be loss of existing under growth during the clearing of the row in readiness for the stringing work. There will also be solid waste generated from the excavation works.

Some of the excavated soil will be reused as backfill while the rest will be disposed of to the designated areas. Solid topsoil wastes from the sites will be the main form of solid waste. Other solid wastes will include metallic pieces, wooden planks, and stone debris. All the wastes will be disposed in the official certified dumping site in each District according to the legislation guiding the same.

Health Issues

Some of the significant health concerns associated with new projects include shortage of facilities like toilets and catering facilities for construction workers. In this instance the constructor remains the only responsible party to ensure that his or her workers are provided with the required facilities. These facilities could either be put in place before the construction of lines commences or arrangement could be done such that the personnel working along the line could get the facilities from the neighboring communities.

The control building for equipment and control facility will be supplied with portable water and shall have sanitation and wastewater facility. Quarterly investigations and maintenance and remedy of failures and accidents will be performed by specifically trained staff.

Safety Issues

During the construction phase, the work will involve the use of sharp objects, noisy machineries and dusty environment. The constructor will be required to provide his workers with the relevant protective gears like boots, gloves, protective clothing dust masks and earmuffs. These should be provided for in the project budget. The ground will also be made wet to prevent dust.

Warning signs will be expected to be displayed next to dangerous points and machines so as to restrict the movement of unauthorized personnel on site during construction and to warn heavy load vehicles that will be at the site against possible danger. All litter and debris will be picked up and disposed in a central disposal site so as to avoid subsequent injuries during and after the construction work is complete. A safety officer will be at the construction site during the construction phase, at all times. The safety officer will make sure a first aid kit is always available and that the skilled workers are aware of the safety rules.

The immediate surrounding will experience an increase in human traffic and noise during ground preparation. In a construction site noise is likely to be produced by the construction machinery excavator and Lorries during the civil works. Noise is also most likely to emanate from the regular masonry operations such as stone dressing.

The machine operators and workers who will be in close proximity to the machinery will be required to wear protective gears such as earmuffs during the construction period. There will be significant amounts of dust during the excavation and civil works. A high fence of about 3.0m with a gate should be done first before most of the other civil works to minimize the dust being blown off by the winds especially if construction will be done during dry spells. This should be done especially for the lines routes . Workers must wear safety gears like gumboots, helmets, safety belts (harness), dust masks and approved welding glasses for welders. Other safety precautions are stipulated in the National Construction standards from Rwanda Housing Authority (RHA).

Table3 : Environmental impacts and mitigation measures

PROJECT ACTIVITY	**POTENTIAL ENVIRONMENTAL ISSUES**	**MANAGEMENT/MITIGATION MEASURES**	**RESPONSIBILITY**	
			PLANNING AND IMPLEMENTATION	**SUPERVISION AND MONITORING**
Pre-construction Stage				
Design and location of Distribution lines	Impact due to location of target sectors close to sensitive	1.Route selection in close consultation with RNRA, EDCL field staff to avoid sensitive areas; 2.Route selection approved by	- Contractor, - District authorities, -	a. monitor conditions of Clearance from REMA/RDB,

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
	ecosystems	REMA/RDB and District Authorities 3.Align routes alongside farm roads and footpaths where possible, alongside forest edges where habitats are already degraded to an extent, and will involve minimum tree felling to minimize design	RESSP/EARP/EDCL	b. District Environmental Specialist c. District Administrative Approval d. Public Consensus from local residents
Construction Stage				
Clearing of RoW along distribution line	Removal of forest cover in biological corridor	1.Ensure that only those trees marked by the forestry staff are felled 2.Follow standard EDCL procedures and practices in clearing RoW 3.Explore possibility of planting low growing vegetation in RoW 4.Reforestation or afforestation to make up for forest cover loss	Contractor, RDB, RESSP/EARP/EDCL	- Environmental Specialists of EARP/EDCL/ RESSP - District Environmental. Officer

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
	Workers could damage species & Habitats outside RoW	1.Mark RoW boundary & prohibit cutting outside; 2.Only fell trees that have been marked by Forestry staff; 3.Prohibit hunting or fishing by workers and enforce strictly; 4.Train workers in importance of wildlife and habitats; 5.Locate labor camps where no forest clearance is needed;	Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/EDCL
	Impact on private land holdings	1.Route the distribution lines along edge of settlements 2.Where routes cross private land, avoid alignments too close to houses or cutting through the centre of fields	Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/EDCL
	Risk of forest fires if cut vegetation is burnt	1.Leave cut material to rot down in situ and do not burn; 2.Leave a covering of grass &	Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/EDCL

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
		other low vegetation in RoW; 3.Dispose of trees as required by Department of Forestry		
Delivery of RE materials to drop off points	Air pollution from vehicular movement	Minimize number of deliveries through timely scheduling	Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/ EDCL
	Carriage of materials to site could block access	Consult farmers when transporting material	Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/EDCL
Excavation at pole sites	Dust may blow from cleared areas	Avoid using large machinery, Manual excavated at pole sites and minimize disturbance at excavated sites,	Contractor-LUCKY EXPORTS	
	Effect on local drainage and soil erosion	Located poles at a minimum distance of 30 m from rivers, and construct these on stable ground	Contractor-LUCKY EXPORTS	Environmental Specialist RESSP/EARP/EDCL
	Excavation for	1Consult community to identify	Contractor-	Environmental

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
	poles could damage water pipes in village	and avoid infrastructure	LUCKY EXPORTS	Specialist RESSP/EARP/EDCL
	Work in villages may create noise, dust & impede access	1.Inform communities of work in advance; 2.Identify sites of local significance; locate no poles nearby; 3.Consult custodians of facilities (monasteries, nunneries, schools, clinics, etc) and avoid working at sensitive and religious times;	Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/EDCL
		▪ Locate new and existing stores of wooden poles far from communities, especially children schools and hospitals entities., ▪ Equip efficiently the staff working closely with poles , especially stores and linesmen staff,	RESS/EARP/EDCL	REMA EDCL/EARP/RESSP
			Contractor-LUCKY EXPORTS	Environmental Specialist, RESSP/EARP/E

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
		▪ Build stores complying with standards by paving the ground to avoid soil and water contamination		DCL
Social and cultural impacts	Economic benefits if local people are employed	Employ as many local residents as possible in workforce	Contractor-LUCKY EXPORTS	Environmental and Social Specialists, RESSP/EARP/EDCL
	Importing foreign workers can cause environmental and social problems at labor camps and in host community	1. Ensure imported workers are provided with housing that has ample toilets, proper drainage and treatment for sewage. 2. Collect solid waste weekly and bury offsite. 3. Instruct workers on required behavior in host community and prohibit them from hunting and fishing. 4.Camps must be cleaned up and restored after project is completed	Contractor-LUCKY EXPORTS	Environmental Specialists

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
	Diseases can be introduced into host communities from social and sexual contact with imported workers	1.Initial screening of workers for HIV/AIDS, TB, malaria, swine flu, etc.; 2.Facilitate access to the nearest Health facility for checkup; 3.Raise worker/community awareness of risks of socially & sexually transmitted diseases; 4.Practical measures, e.g. free condoms for workers;	Contractor-LUCKY EXPORTS	Environmental and social Specialists RESSP/EARP/EDCL
	Workers and communities are at risk from accidents on site	Prepare and implement a site Health and safety plan that includes measures to: -Exclude the public from all constructions sites; -Ensure that workers use personal protection equipment; -Provide Health & Safety training for all personnel; -Follow documented procedures	Contractor-LUCKY EXPORTS	Environmental and social Specialists RESSP/EARP/EDCL

PROJECT ACTIVITY	POTENTIAL ENVIRONMENTAL ISSUES	MANAGEMENT/MITIGATION MEASURES	RESPONSIBILITY	
			PLANNING AND IMPLEMENTATION	SUPERVISION AND MONITORING
		for all site activities; -Keep accident reports and records; -Inform local communities about the work and dangers		
	Impact on private land and infrastructure	Conduct awareness programs/meetings Grievance redress mechanism in place. This is unlikely to occur.	RESSP/EARP/EDCL	Environmental and social Specialists RESSP/EARP/EDCL

Table3: Environmental impacts and mitigation measures

CHAP 5: MONITORING PLAN PROTOCOL FOR MV & LV Lines

6.1 Monitoring Plan

A detailed environmental monitoring plan has been developed to verify that predictions of environmental impacts are accurate and that unforeseen impacts are detected at an early stage and allow corrective measures to be implemented, if needed. During the construction phase the plan provides for dust, noise, visual impacts, service disruption and safety monitoring.

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

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, with a direct reporting to the monitoring and the implementing agency, EDCL. It is the Contractor's responsibility to conduct the inventory and valuation of assets (Crops and trees along the RoW) for compensation. Compensation/ payment is a concern of EDCL and the land acquisition will not happen due to the fact that the project will not affect all types of land, only assets on land to be affected. It the EDCL/RESSP's responsibility to monitor the implementation of contractor's responsibilities.

EDCL should in turn undertake independent monitoring of selected parameters to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMP and construction contract clauses for the Project. EDCL also have the direct responsibility to implement and monitor land acquisition and compensation issues as outlined in the ARAP. Their Project teams should include an environmental monitoring and management specialist as well as a sociologist experienced in land acquisition and compensation issues. REMA 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 the Project unless some specific major environmental issue arose.

6.2 Environmental monitoring of the following parameters is recommended as a minimum for RESSP/EARP 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 in the first instance to identify the level of monitoring required.

Soil Erosion Monitoring

The excavation of earth for the establishment 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 towers. The Contractor's environmental inspectors should make sure that the unique tree stands identified during the present study should not be removed.

Monitoring Rehabilitation of Work Sites

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

Monitoring of Accidents/Health

The Contractor's environmental inspectors must make sure that appropriate signs are posted at appropriate locations/positions to minimize/eliminate risk of electrocutions.

In addition the environmental inspectors should make sure that:

- RESSP/EARP/EDCL will have overall responsibility to oversee that all environmental measures are put in place and that regulations are enforced.
- RESSP/EARP/EDCL, fully engaged in this process prior to make sure that contractors fulfill the environmental requirements.

The following parameters could be used as indicators:

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

6.2 Responsibilities and Costs for Environmental Mitigation Measures

The table below outlines the overall package of environmental mitigation measures that will be implemented in relation to the facility as outlined in detail in the EMP document. The table also assigns general responsibilities for implementing each group of mitigation measures.

Consistent with the RESSP/EARP/PIU and WB's contracting strategy of integrating environmental protection and mitigation activities into the Contractor's Scope of Work, the specifications for many of the activities were included in the bid package upon which the Contractor is developing its base rates. Therefore, since many of the costs associated with environmental protection and mitigation activities are included in the Contractor's base rates, it is not possible to present a detailed accounting of all the monies devoted to the project's construction phase environmental protection and mitigation activities.

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

Table4 : Environmental Management and Monitoring Plan (EMMP)

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
PRE-CONSTRUCTION							
Impact due to location of target villages biological corridor	1.Route selection in close consultation with RNRA, EDCL field staff to avoid sensitive areas;	RDB/EC clearance and approval conditions	MV lines	Route selection and approval	N/A	EARP, EDCL	N/A
	2.Route selection approved by REMA / RDB and District Authorities	RDB/EC clearance and approval conditions	MV lines	Field investigation by Environmental Specialists (ES)	N/A	EARP, EDCL RDB	N/A
	3.Route should be selected so that clearance along forested areas are avoided	RDB/EC clearance and approval	MV lines	Mapping of field information	N/A	EARP, EDCL, Contractor-Lucky exports	43,000

Potential impacts	**Mitigation measure**	**Parameters to be monitored**	**Location**	**Method**	**Monitoring Frequency**	**Responsibility**	**Cost (USD)**
	wherever possible; where there is no alternative to routing lines through forest, align routes alongside farm roads and footpaths where possible, alongside forest edges where habitats are already degraded to an extent, and will involve minimum tree felling.	conditions					
Community Consultation	Inform all communities along transmission route of schedule of implementation of Project and their rights to compensation	Properly convened meetings	MV lines	Awareness meeting	N/A	Contractor &EDCL	2,850
Training	Organize environmental management and safety training		MV lines	On-site training	N/A	Contractor – LUCKY EXPORTS	7,270

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
	All Contractor's staff shall attend the training						
▪ Public & Occupation Health and Safety ▪ Accidents resulting from sharp and falling objects	Preparation of a Health and Safety Plan for workers and impacted communities addressing issues including: • Education of workers and impacted communities • Provision of personal protective equipment to workers during construction • Use of child labor to be prohibited Provision of protective gear(gloves, gumboots, helmets and raincoats)	-Protected workers at sites Consultation with public Workers using gloves, gumboots, helmets and raincoats			Monthly	Contractor – LUCKY EXPORTS	21000

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
Work site Survey and Pegging	Survey the proposed line with a level and peg. Jointly inspect the surveyed alignment	Surveyed line with marked boundaries			Monthly	Contractor – LUCKY EXPORTS	
CONSTRUCTION							
Removal of forest cover in protected area	1.Ensure that only those trees marked by the forestry staff are felled 2.Follow standards, EARP/EARP/EDCL procedures and practices in clearing ROW	Number of violations	MV lines	Site Observations	Two weeks	EARP/EDCL& ES	3,500
	Explore possibility of planting low growing vegetation in RoW	Revegetation of RoW	MV lines	Site Observations	Two weeks	EARP/EDCL& ES	1,850
Solid soil waste and	Transportation of waste	Clean site and	MV	Site	N/A	Contractor –	Included

Potential impacts	**Mitigation measure**	**Parameters to be monitored**	**Location**	**Method**	**Monitoring Frequency**	**Responsibility**	**Cost (USD)**
stone debris People falling in dug holes Slopping areas	from site & safe disposal Cover tower holes and pole holes immediately and always at night Level the ground and provide proper drainage systems to avert drainage problems	disposal certificate Covered holes especially at Leveled ground	lines	Observations		LUCKY EXPORTS	in the cost of site preparation
Lack of toilets for site workers	Use mobile toilets as the contractor is on site. Use available and availed toilets/ latrines by the contractor	Availability of mobile plastic toilets	MV lines	Site Observations	N/A	Contractor – LUCKY EXPORTS	1,500

Potential impacts	**Mitigation measure**	**Parameters to be monitored**	**Location**	**Method**	**Monitoring Frequency**	**Responsibility**	**Cost (USD)**
Visual character of local landscape	• All transmission towers should be erected away from residential areas • Use common corridors/RoWs to minimize impacts on undisturbed areas • The transmission lines should be as straight as possible • Straightness and symmetry during line construction	. Residential to be at least at 15 m from the towers . Lack of zigzag transmission line . Straight and symmetrical power lines.	MV lines	Site Observations	N/A	Contractor – LUCKY EXPORTS	N/A
Noise levels during construction and operations	Provision of Ear plugs	Use of ear plugs during noisy activities	MV lines	Site Observations	N/A	Contractor – LUCKY EXPORTS	2,300

Potential impacts	**Mitigation measure**	**Parameters to be monitored**	**Location**	**Method**	**Monitoring Frequency**	**Responsibility**	**Cost (USD)**
Loss of aesthetic values	Plant trees at 10 trees per hectare	Undisturbed environment	MV lines	Site Observations	N/A	Contractor – LUCKY EXPORTS	1000
Ecological Impacts. (disturbance of existing habitats and land uses)	Restrict RoW width and avoid unnecessary vegetation disturbance/ clearing Replanting trees	More trees planted Restored undisturbed vegetation cover	MV lines	Site Observations	N/A	Contractor – LUCKY EXPORTS	N/A
Destroyed fields, trees and crops	Compensation for destroyed trees and crops and replanting of trees	Adequately compensated PAPs and more trees planted	MV lines	Site Observations	N/A	EARP/RESSP	Included in the RAP
Drainage	In sections along water courses, earth and	Properly disposed	MV lines	Site Observations	N/A	Contractor – LUCKY	1,100

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
	construction waste will be properly disposed of so as to not block rivers and streams, resulting in adverse impact on water quality. • All necessary measures will be taken to prevent earthworks from impeding cross drainage at rivers/ streams, canal/existing irrigation and drainage systems • Use of overhead cabling as much as possible	waste				EXPORTS	
Socio-environmental issues	Advise the local community of project plans in advance of construction, and involve	Public participation meetings	MV lines	Public consultation	N/A	EDCL/EARP/RESSP	600

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
	them in the site / construction planning process • Identify culturally sensitive areas and avoid disturbing them • Avoid disturbances near residential areas where possible • Control run-off and manage sediment near residential areas	Culturally sensitive sites identified		meetings		Contractor	
	Arrange for local people to be employed and trained • Include women, poor & vulnerable groups in the implementation of the Project activities • Negotiate and agree on	Public consultation meetings	MV lines	Site Observations	N/A	Contractor – LUCKY EXPORTS	600

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
	with community about disposal areas and stockpile sites						
	Water provision	Water /drinking water provision	MV lines	Site Observations	During commencement of works	Contractor – LUCKY EXPORTS	1,050
		Access to electricity	MV lines	Site Observations	Service connection		N/A
Solid soil waste and stone debris People falling in dug holes	Transportation of waste from site & safe disposal Cover tower holes and pole holes immediately and always at night	Clean site and disposal certificate Covered holes especially at	MV lines	Site waste handling	Dumping		900

Potential impacts	**Mitigation measure**	**Parameters to be monitored**	**Location**	**Method**	**Monitoring Frequency**	**Responsibility**	**Cost (USD)**
Slopping areas	Level the ground and provide proper drainage systems to avert drainage problems	Leveled ground					
Workers could damage species & Habitats outside RoW	1.Mark RoW boundary & prohibit cutting outside; 2.Only fell trees that have been marked by forestry staff;	Number of violations	MV lines	Site Observations	Two weeks	LUCKY EXPORTS, EARP/EDCL/RESSP&ES	N/A
	3.Prohibit hunting or fishing by workers and enforce strictly	Number of illegal reports	Camp sites	Site Observations surveys	Monthly	EARP/EDCL& ES	Included in contractor's EHSP cost
	4.Train workers in importance of wildlife and habitats;	Number of illegal reports	Labour camps	Contractor records	Monthly	EARP/EDCL& ES	

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
	5.Locate labor camps where no forest clearance is needed;	Number of illegal reports	Labour camps	Site Observations	Monthly	EARP/EDCL& ES	
	6.Provide adequate food supply so workers do not need to hunt or fish	Illegal activities	Labour camps	Site Observations	Monthly	EARP/EDCL& ES	
Impact on private land holdings	Route feeders along edge of villages, avoid locating poles in centres of fields	Feeder alignment	MV lines	Site Observations	Monthly	EARP/EDCL& ES	
Risk of forest fires if cut vegetation is burnt	Leave cut material to rot down in situ and do not burn. Leave a covering of grass & other low vegetation in RoW;	Number of fires	MV lines	Site Observations	Two weeks	EARP/EDCL& ES	
	Dispose of trees as required by Department of forest	Disposal of trees	MV lines	Site Observations	Two weeks	EARP/EDCL& ES	N/A

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
Delivery of RE materials to drop off points - Air pollution from vehicular movement	Minimize number of deliveries through timely scheduling	Number of deliveries	Drop off points	Site Observations	Monthly	EARP/EDCL& ES	N/A
Carriage of materials to site could block access	Consult farmers when transporting material	Number of consultations	MV and LV lines	Site Observation; Village survey, Consultation meetings	Monthly	EARP/EDCL& ES	400
Excavation at pole sites-dust may blow from cleared areas	Avoid using large machinery, manual excavation at pole sites and minimize disturbance at excavated sites,	Site Observations	MV lines	Site Observations	Monthly	EARP/EDCL& ES	N/A

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
Effect on local drainage and soil erosion	Locate poles at a minimum distance of 30 m from rivers, and construct these on stable ground		MV lines	Site Observations	Monthly	EARP/EDCL& ES	N/A
Excavation for poles could damage water pipes in villages	Consult community to identify and avoid infrastructure	Number of consultations with local infrastructure officials	MV and LV lines	Site Observation; Village survey, Consultation meetings	Monthly	EARP/EDCL& ES	N/A
Work in villages may create noise, dust & impede access	1.Inform communities of work in advance;		MV and LV lines	Site Observation; Village survey	Monthly	Contractor EARP/EDCL& ES	N/A
	2.Identity sites of local significance; locate no poles nearby;		MV and LV lines	Site Observation; Village	Monthly	Contractor EARP/EDCL&	N/A

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
				survey		ES	
	3.Consult custodians of facilities (monasteries, nunneries, schools, clinics, etc) and avoid working at sensitive and religious times;		MV and LV lines	Site Observation; Village survey	Monthly	Contractor EARP/EDCL& ES	N/A
Economic benefits if local people are employed in contractor's workforce	Employ as many local residents as possible in workforce	Number of locals employed	All sites	Site Observation; worker survey	Monthly	Contractor EARP/EDCL& ES	N/A
Importing foreign workers can cause environmental and social problems at labor camps and in	1. Ensure imported workers are provided with housing that has ample toilets, proper drainage and treatment for sewage.	Number of observations from camp site	All sites	Site Observation; worker survey	Monthly	Contractor EARP/EDCL& ES	Included in CB

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
host community	2. Collect solid waste weekly and bury offsite.		All sites	Site Observations	Monthly	Contractor – LUCKY EXPORTS& EARP/EDCL& ES	
	3. Instruct workers on required behavior in host community and prohibit them hunting and fishing.		All sites	Site Observation; worker survey	Monthly	Contractor EARP/EDCL& ES	
	4. Camps must be cleaned up and restored after project is completed.		Labour camps	Site Observation; worker survey	Monthly	Contractor – LUCKY EXPORTS	
Diseases can be introduced into host communities from social and	1.Initial screening of workers for HIV/AIDS, TB, malaria, swine flu, etc.;	Contractors record on Health issues	Labour camps	Site Observation; worker survey	Monthly	Contractor – LUCKY EXPORTS, Local	Included in Contract or's costs

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
sexual contact with imported workers						authorities	
	2.Facilitate access to the nearest Health facility for checkup;		Labour camps	Site Observation; worker survey	Monthly	Contractor – LUCKY EXPORTS, Local authorities	
	3.Raise worker/community awareness of risks of socially & sexually transmitted disease;		Labour camps	Site Observation; worker survey	Monthly	Contractor – LUCKY EXPORTS, Local Authorities	
	4.Practical measures, e.g. free condoms for workers;		Labour camps	Site Observation; worker survey	Monthly	Contractor – LUCKY EXPORTS, EARP/EDCL& ES, Local	

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
						Authorities	
Workers and villagers are at risk from accidents on site	Implement Health and safety plan that includes measures to: -Exclude the public from all construction sites; -Ensure that workers use personal protective equipment and Provide Health & safety training for all personnel; -Follow documented procedures for all site activities and Keep accident reports and records; -Inform local communities	Health and safety mgt. plan	Labour camps	Site Observations	Monthly	Contractor – LUCKY EXPORTS	Included in the CEHS Plan

Potential impacts	Mitigation measure	Parameters to be monitored	Location	Method	Monitoring Frequency	Responsibility	Cost (USD)
	about the work and dangers						

ES: *Environmental Specialists****;*** ***CB:*** *Capacity Building****;*** ***RE:*** *Rural Electrification****;*** ***O&M:*** *Operation& Maintenance,* ***RDB/EC:*** *Rwanda Development Board/Environmental Compliance****.***

Table4 : Environmental Management and Monitoring Plan (EMMP)

7.1 Environmental Management and Monitoring Costs

The table below provides a summary of the capital costs that will be incurred by either the contractor or EARP/EDCL during monitoring. The costs to be met by the contractor in ensuring mitigation will be contained in the final bid document and for this reason cannot be reflected in this table at this point in time. The costs for compensating the PAPs will be met by EDCL and is to be contained in the separateResettlement Acton Plan (RAP)

Table 5: Environmental Management and Monitoring Costs

Activity	**Estimated Cost in (USD)**	**Cost to be met by**
Valuation and Inventory ofdestroyed Trees, crops and vegetation	Within Contractor's Budget	Contractor –LUCKY EXPORTS
Compensation destroyed Trees, crops and vegetation	To be provided in RAP	EDCL/EARP/RESSP
Mitigating Impacts of civil construction related works	Within Contractor's Budget. The costs associated to mitigating the impacts of the construction activities will be met by the contractor.	Contractor LUCKY EXPORTS
TOTAL CAPITAL COSTS	**CONTRACTOR'S BUDGET**	**CONTRACTOR'S BUDGET**

Table 5: Environmental Management and Monitoring Costs

Recurring costs imply costs that will be met by the Contractor either on annual or monthly basis. At this point in time, the costs related to replacement of new PPE will largely depend on the rate of wear and tear, however and is part of the overall budget of the Contractor.

Cost related to maintenance of the fire equipment will be met biannually and costs towards solid waste disposal will be monthly throughout the project life:

Table 6 : Recurrent costs estimates

Activity	**Estimated Cost in (USD)**	**Cost to be met by**
Procurement of PPE for staff	Costs to be incurred depending on the rate of wear and tear of the PPE.	Contractor- LUCKY EXPORTS
Regular Maintenance of Fire Equipments at the site	To be included implementation Budget of the Health and Safety plan	Contractor- LUCKY EXPORTS
TOTAL RECURRENT COSTS	**Contractor's budget**	Contractor- LUCKY EXPORTS

Table 6 : Recurrent costs estimates

Monitoring and Evaluation

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that they are effective. Environmental and social monitoring will also enable response to new and developing issues of concern. The activities and indicators that have been recommended for monitoring are presented in the ESMP.

Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The contractor shall employ an officer responsible for implementation of social/environmental requirements. This person will maintain regular contact with EDCL/EARP/RESSP's Senior Environmental Safeguards Specialist and the local District Environmental Officers. The contractor and EDCL/EARP/RESSP have responsibility to ensure that the proposed mitigation measures are properly implemented during the construction phase.

The environmental monitoring program will operate through the pre-construction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment. The following aspects will be subject to monitoring:

- Prohibited Encroachment into protected and sensitive areas
- Vegetation maintenance around project work sites, workshops and camps
- Works safety elements, including a log of accidents
- HIV/AIDS program implementation and levels at local health centers

Monitoring should be undertaken at a number of levels. Firstly, it should be undertaken by the Contractor at work sites during construction, under the direct reporting to the monitoring and the implementing agency, EDCL/EARP/RESSP. It is the Contractor's responsibility to monitor property valuation for compensation issues. It is recommended that the Contractor employ local full time qualified environmental inspector for the duration of the Contract.

Environmental monitoring is also an essential component of project implementation Unit (PIU). 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.

The Monitoring includes:

- ❖ Visual observations;
- ❖ Selection of environmental parameters at specific locations;
- ❖ Sampling and regular testing of these parameters.
- ❖ Periodic ongoing monitoring will be required during the life of the Project and the level can be determined once the Project is operational.

8.1. Internal Monitoring

It is the responsibility of the EDCL/EARP/RESSP proponent to conduct regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental & social mitigation measures contained in the ESMP and construction contract clauses for the Project. EDCL/EARP/RESSP also have the direct responsibility to implement and monitor land acquisition and compensation issues as outlined in the ARAP. Their Project teams should include an environmental monitoring and management specialist as well as a sociologist experienced in compensation issues.

The monitoring should be a systematic evaluation of the activities of the operation in relation to the specified criteria of the condition of approval. In undertaking the same, EDCL/EARP/RESSP through RESSP will be responsible for implementing resettlement and compensation activities and it will therefore be their responsibility to undertake regular internal monitoring of the process.

8.1.1 Noise Levels Monitoring

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

8.1.2. Air Quality Protection

The Construction Contractor shall monitor wind velocity and site dust levels during earthmoving activities. The Construction Contractor shall also monitor emissions from vehicles. If excessive dust is generated, the Construction Contractor shall immediately water/spray down areas generating dust or, if this is not effective, cease the activities generating dust. Stop all excavation work if wind threshold velocity has been exceeded.

8.1.3. Soil Erosion Monitoring

The excavation of earth for the establishment of towers/poles, temporary and permanent access roads, work camps 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.

8.1.4. Monitoring of Vegetation Clearing

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

8.1.5. 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 EDCL/EARP/RESSP environmental staff.

8.1.6. Monitoring of Accidents/Health

The Contractor's environmental inspectors/Engineer must make sure that appropriate signs are posted at appropriate locations/positions to minimize/eliminate risk of electrocutions as described in EHS Plan

In addition the environmental inspectors should make sure that:

- Measures to create awareness regarding sexually transmitted diseases, primarily HIV/AIDS, and other diseases such as malaria re taken;
- Preventive measures to reduce/eliminate malarial, infections where/when ever appropriate are put in place;
- Quarterly health surveys are carried out along the transmission route; EDCL/EARP/RESSP will have overall responsibility to oversee that all environmental measures are put in place

and that regulations are enforced. The EDCL/EARP/RESSP shall assist in this process in order to make sure that the contractor is fulfilling the environmental compliance requirements.

The following parameters could be used as indicators:

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

8.2. Key Parties, Personnel and Responsibilities

a. The Client and Principal Subcontractor

Lucky Export has been appointed as the Principal Contractor (PC) for the works by Energy Development Corporation Limited (EDCL) LTD through Rwanda Electricity Sector Strengthening Project (RESSP). The Client and PC must, so far as is reasonably practicable, comply with a number of duties laid out in the regulations. These include (but not limited to):

- Ensuring cooperation between contractors during the construction phase.
- Induction, information and training for every worker, with respect to the Solid Waste Management Plan (SWMP).
- Ensuring that waste produced is reused, recycled or recovered.

The Principal Contractor must also:

- Review the plan.
- Record quantities and types of waste produced.
- Record the types and quantities of waste that have been:
    - ✓ Re-used (on or off site).

- ✓ Sent to other forms of recovery (on or off site);
- ✓ Sent to landfill.
- ✓ Otherwise disposed of.

- Update the plan to reflect the progress of the proposed works.

b. Environmental Officers

The Environmental specialist (Sub/Contractor) is responsible for the following activities in relation to waste management: Maintaining and updating this procedure and carrying out regular inspections to ensure compliance with this procedure. Assessing waste streams and arranging appropriate disposal methods for each waste stream. Collect data from waste streams, such as quantity (weight/volume) & the type of waste.

Make waste data available to the Project Team to be used as KPI's (Key Performance Indicators) for both the PC (including Subcontractors) and the Client. This will be forwarded to the Project Team on a monthly basis. Ensuring that all waste (including Subcontractor waste) is dealt with in a safe, efficient and legal manner. Ensuring that all paperwork relating to waste management is retained on site advising the construction team on best practice and requirements for legal compliance.

Identifying activities exempt from waste management licensing and registering them with the Environment Agency. Ensuring that relevant project personnel are provided training on the application of this procedure to their work. Transfer of the closed SWMP to the Client at the end of the proposed works.

At the end of the proposed works (and within 3 months), the following items will be incorporated into the SWMP prior to transfer to the client:

- Confirmation that the plan has been monitored on a regular basis to ensure the work was progressing according to the plan and that the plan has been updated.
- Explanation to any deviation of the plan.
- An estimate of cost savings achieved by implementing the plan.
- A comparison of estimated waste quantities against actual waste quantities.

c. Facilities Manager

The site Facilities Manager (Environmental Officer/Lead Environmental Personnel where there is no position of Facilities Manager) is responsible for the following activities in relation to waste management: Day to day monitoring of waste and scheduling of skip exchanges and tankers for waste removal on site when required. Ensure that each load of waste goes off site under its own waste transfer ticket containing the correct information complying with the duty of care. Monitor and ensure that all skips/waste receptacles are clearly signed/colour coded for the appropriate waste stream (i.e. general waste, metal, wood and COSHH (Control of Substances Hazardous to Health)).

Monitor, and maintain COSHH management on site. Assist Project Environmental Officer with any further waste management issues.

d. All Staff

Minimize the generation of waste (for example, by not over-ordering, storing correctly to minimize spoilage). Handle, dispose and segregate all waste appropriately. Where in doubt, advice should be sought from the Construction Waste Management Plan, or direct from the Environmental Department.

Expected Project Waste, Disposal, and Handling:

The following charts identify waste materials expected on this project, their disposal method, and handling procedures:

Material	Quantity	Disposal Method	Handling Procedure
Land clearing debris		Keep separate for reuse and or wood sale	Keep separated in designated areas on site
Clean dimensional wood and palette wood		Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects.	Keep separated in designated areas on site. Place in "Clean Wood" container.
Plywood, OSB, particle board		Reuse, Dump in an Distr official landfill	Keep separated in designated areas on site. Place in "Trash" container.
Painted or treated Wood		Reuse, Dump in an Distr official landfill	Keep separated in designated areas on site. Place in "Trash" container.
Concrete		Recycle	
Concrete Masonry Units		Keep separate for re-use by on-site construction or by site employees	Keep separated in designated areas on site
Metals		Reuse, Dump in an District official landfill	Keep separated in designated areas on site. Place in "Metals" container.
Gypsum drywall (unpainted)		Recycle with supplier	Keep scraps separate for recycling – stack on pallets in provided on site. All scrap drywall will be taken back by

Material	Quantity	Disposal Method	Handling Procedure
			contractor to drywall supplier
Paint		Reuse or recycle at Environmental Depot;	Keep separated in designated areas on site
Insulation		Reuse, Dump in an Distr official landfill	
Flooring		Reuse, Dump in an offic landfill	
Carpet and pad		Reuse or recycle with carpet manufacturer	
Glass		Glass Bottles: Reuse, Dump in an Distr official landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Plastics		Plastic Bottles: Reuse, Dump in an Distr official landfill Plastic bags/scraps Reuse, Dump in an offic landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Beverage		Reuse, Dump in an Distr official landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/

Material	**Quantity**	**Disposal Method**	**Handling Procedure**
			Cardboard" container
Cardboard		Reuse, Dump in an Distr official landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Paper and newsprint		Reuse, Dump in an Distr official landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
TOTAL		CONTRACTORS'S BUDGET	CONTRACTOR'S BUDGET

The Construction Contractor shall regularly monitor the management of wastes to ensure that;

1. All stores waste shall be contained within construction sites;
2. Solid waste: all site waste is to be collected and disposed of in an approved registered landfill. Where possible segregation of waste (paper, glass, metal) should be undertaken and recycling opportunities identified.
3. Compost or use as animal food all green or organic wastes; and
4. Sewage shall be disposed of into sealed pit latrines or into a septic tank system, or other approved sanitation devices.

8.3. Workforce Training

The Construction Contractor shall ensure that all workers have been inducted. The Construction Contractor shall regularly monitor that occupational health and safety requirements are implemented. EDCL/EARP/RESSP's representative shall audit that all requirements are met. Where occupational health and safety requirements are not being implemented relevant workers shall immediately be trained and instructed to implement these requirements.

8.4. External Monitoring and Evaluation

The ESMP recommends that an external consultant should be hired to carry out Annual Environmental Audits in line with REMA requirements. REMA has the overall responsibility for issuing approval for the Project and ensuring that their environmental guidelines are followed during Project implementation.

EDCL/EARP/RESSP through the consultant will therefore provide to REMA with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental auditing reports. Depending on the implementation status of environmentally sensitive project activities, REMA will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

Table 7: Monitoring Plan

ENVIRONMENTAL COMPONENT	PARAMETER	STANDARD	LOCATION	FREQUENCY	DURATION	IMPLEMENT	SUPRVISION
Pre-Construction Phase							
Compensation and Land Acquisition	Ensure compensation paid as per ARAP	ARAP	Along ROW for all PAPs	Monthly until it is completed	EDCL/EARP/RESSP	Contractor –LUCKY EXPORTS & EDCL/EARP/RESSP	EDCL/EARP/ RESSP
Construction Phase							
Noise levels	Noise levels on dB (A) scale	REMA guidelines EH&S Plan	Noise level meter kept at a distance of 15m from edge of ROW	As directed by the consultant	Readings to be taken at 15 second interval for 15 min every hour and then averaged	Contractor Contractor –LUCKY EXPORTS	EDCL/EARP/ RESSP
	Noise levels on	REMA guidelines	At equipmen	Monthly as required by		Contractor –LUCKY	EDCL/EARP/RESSP

ENVIRONMENTAL COMPONENT	PARAMETER	STANDARD	LOCATION	FREQUENCY	DURATION	IMPLEMENT	SUPRVISION
	dB (A) scale		t yards	the consultant		EXPORTS	
Soil Erosion	Turbidity in stormy water	REMA guidelines	As identified by EDCL/ EARP	During and after the rainy seasons		Contractor –LUCKY EXPORTS	EDCL/EARP/ RESSP
Vegetation Clearing	Monitor clearing to ensure consistent with ESMP	ESMP &EH&S Plan	Along ROW and works area	As required		Contractor –LUCKY EXPORTS	EDCL/EARP/ RESSP
Rehabilitation of work sites	Monitoring to ensure all work sites are progressively rehabilitated	ESMP	Work camps, material storage sites, along ROW	As required		Contractor –LUCKY EXPORTS	EDCL/EARP/ RESSP
Accidents	Safety training for workers, accident reports,	ESMP and EH&S Plan	Along ROW	Monthly		Contractor –LUCKY EXPORTS	EDCL/EARP/ RESSP

ENVIRONMENTAL COMPONENT	PARAMETER	STANDARD	LOCATION	FREQUENCY	DURATION	IMPLEMENT	SUPRVISION
	community consultations						
Health	Signs, posters displayed, health awareness lectures, mosquito nets in malarial areas for each worker, health checks for workers.	ESMP and EH&S Plan	Along ROW, work camps and surrounding areas	Monthly		Contractor –LUCKY EXPORTS	EDCL/EARP/ RESSP

Table 8: Budget Estimate for Monitoring

Component	Item	Unit cost (Frw)	Quantity	Total Cost (Frw)
Noise levels	At equipment yards, along ROW	25,000	10 samples	250,000
Soil erosion	Measurement of turbidity	22,000	10 samples	220,000
Contractor staff	Environmental Inspectors	150,000/person/ Month	2 full time equivalent staff for duration of project	5,400,000/12 Months
EDCL/EARP/RESSP staff	Environmental monitoring staff	100.000/month	1 full time equivalent staff for duration of project	1,200,000 /12 Months
Training	As per training program		Transport, equipment and other logistics	1,250,000

Table 7: Monitoring Plan

9 Public Consultations and Public Disclosure

Community participation and consultation were undertaken among people living along the proposed distribution line corridor and area of influence as an integral part of the ESMP study. These meetings enabled interested and affected parties to contribute their concerns (views and opinions on the proposed development) which might have been overlooked during the scoping exercise. A synopsis of the views of the project affected people as well as representatives of the

Local Authorities in the sectors, cells and districts through which the project traverses; who will be interviewed in predicting impacts and the development of the ESMP.

The consultant particularly gave close attention to persons within the proposed RoW trace. The views of these stakeholders were considered and their names, identification numbers and contacts taken for future references as required by REMA.

10 Institutional Arrangements

The following institutional arrangement will be responsible for project implementation.

Rwanda Environmental and Management Authority (REMA): will ensure that all the relevant rules and regulations concerning the environment are adhered to in line with the Regulations 2006.

Energy Development Corporation Limited (EDCL/EARP/RESSP):

It has been vested with the overall responsibility for the coordination, planning and implementation of the Project.

Environmental steering committee: This committee will comprise representatives from EDCL/EARP/RESSP, REMA, Financing institutions (WB, Civil society and the community). This will ensure that the actual implementation of the environmental monitoring and management is carried out.

Contractor- LUCKY EXPORTS:

The contractor will be responsible for actual construction and installation works.

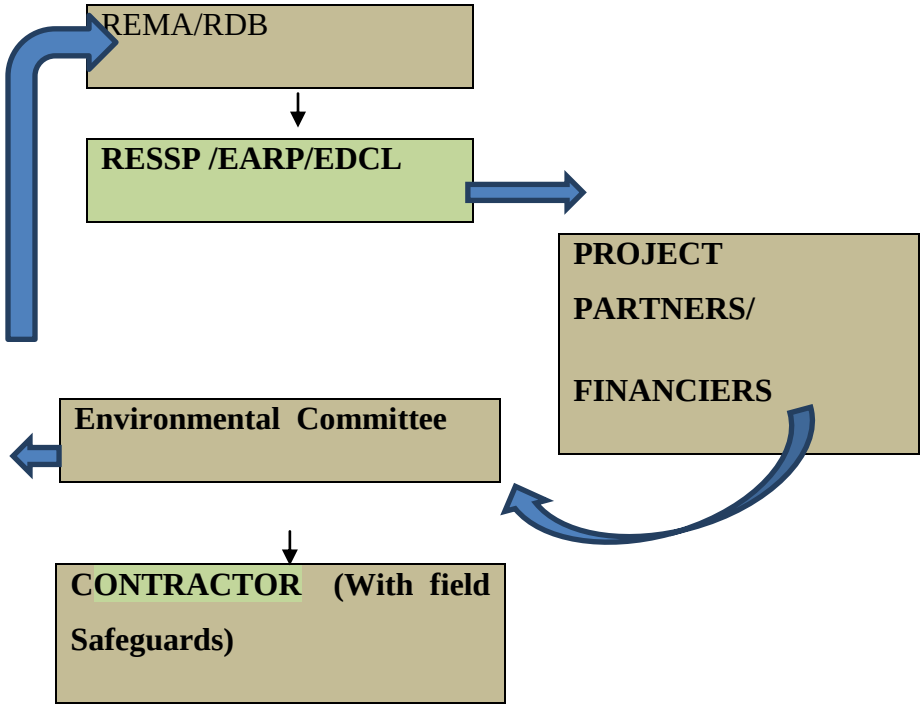


Figure 5: Summary of institutional arrangements

11. COMPLEMENTARY INITIATIVES

i. Conservation Measures

This activity will mitigate and respond to the potential impacts of the project on protected areas. It will review the approach and methodology for the conservation campaigns and monitor the effectiveness of the proposed mitigation measures. The activity will take place during construction and operation, and will recommend new mitigation measures where those proposed are not effective. Emphasis on collaboration with the Rwanda Wildlife Service and local communities will ensure success of the proposed conservation measures.

ii. HIV/AIDS Component

The activity will involve implementation of the anticipated HIV/AIDS Approach and Awareness/Prevention Campaign from mitigation measures. There will be a review of mid-term likely effectiveness of the approach and methods adopted in case new approaches and strategies are deemed appropriate as per CEHSP elaborated and its implementation. The activity will thus be re-oriented as necessary to achieve its full potential in lasting benefits to project affected communities by the end of the construction period.

11.1. Implementation schedules and reporting

The implementation will be rolled out as required for each project component in line with the construction timetable and frameworks established for surveying and consultation, Construction, management and monitoring. EDCL/RESSP will have responsibility for approval of social and environmental aspects of the projects, prior to the sound compliance.

REFERENCES

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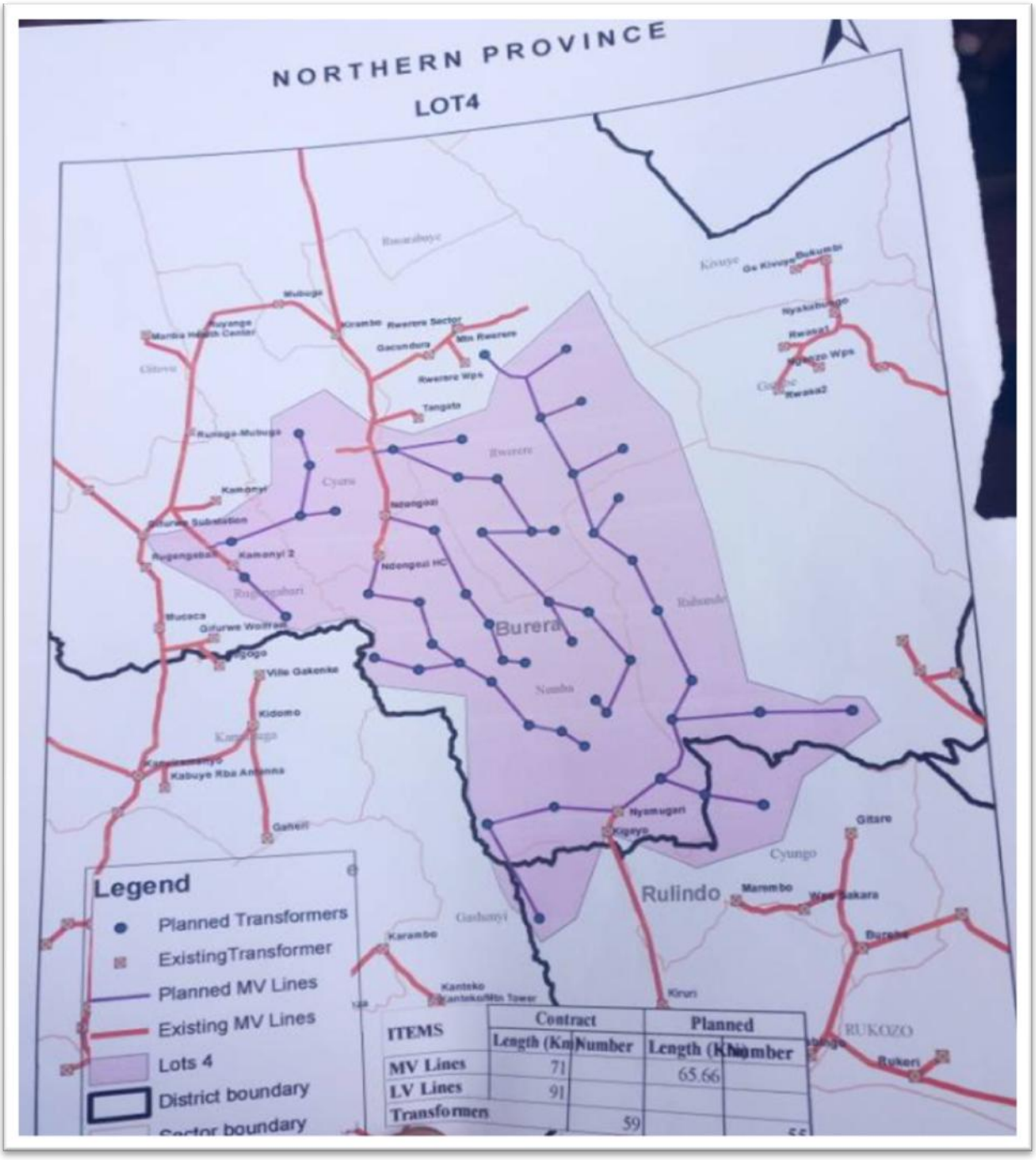
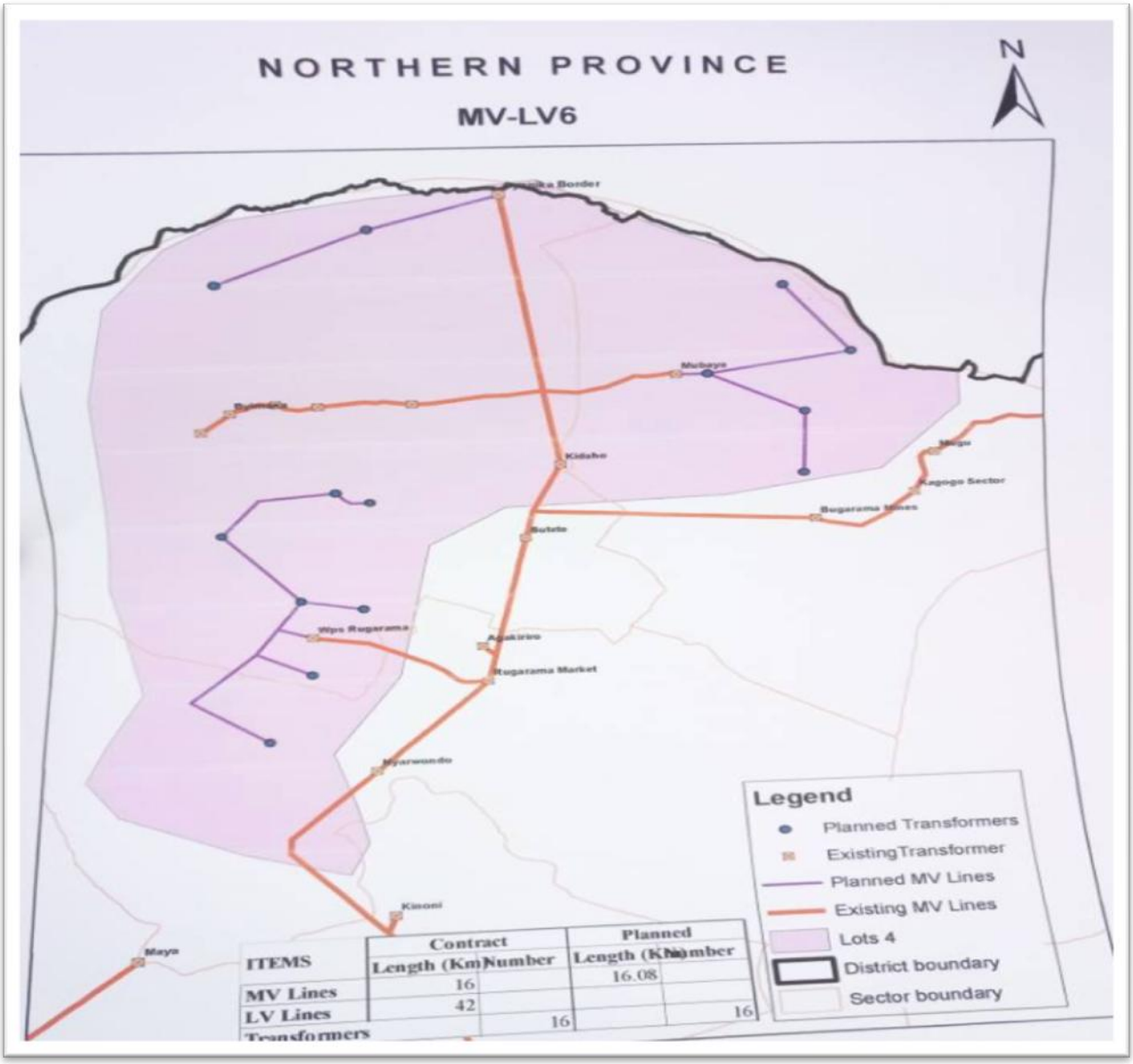
APPENDICES

Detailed sites Maps (Lot 4, 5&8)





ITEMS	Contract		Planned	
	Length (Km)	Number	Length (Km)	Number
MV Lines	16		16.08	
LV Lines	42			
Transformers		16		16