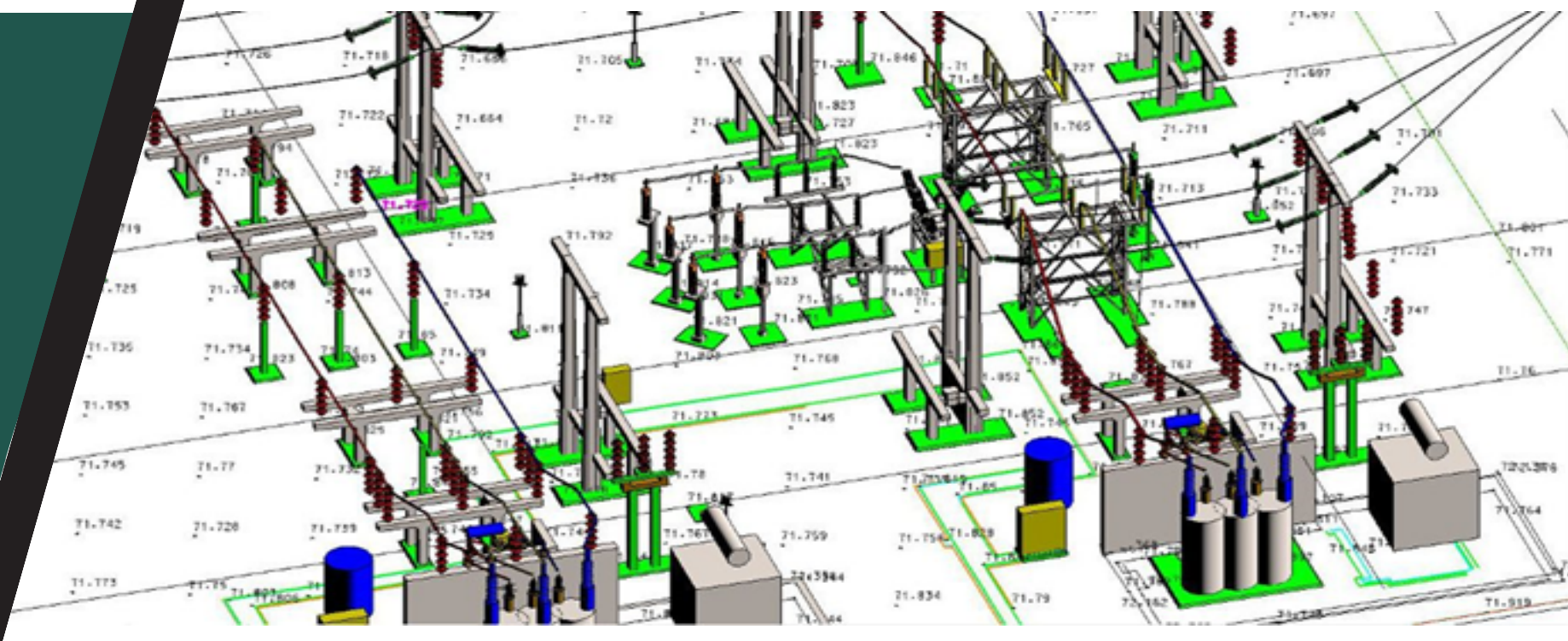
Environmental and Social Impact Assessment (ESIA) Report



RWANDA TRANSMISSION SYSTEM REINFORCEMENT AND LAST MILE CONNECTIVITY

June 2020

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Acronyms

7YGP:	7 Year Government Program
AfDB / ADB:	African Development Bank
AFSEC:	African Electrotechnical Standardization Commission
CAPP:	Central Africa Power Pool
CÉÉAC / ECCAS:	Communauté Économique des États de l'Afrique Centrale / Economic Community of Central Africa States
CÉPGL:	Communauté Économique des Pays des Grands Lacs/ Great Lakes Countries Economic
CES:	Consultant's Environmental Specialist
CO2:	Carbon Dioxyde
CSOs:	Civil Society Organizations
DEM:	Digital Elevation Model
DRC:	Democratic Republic of Congo
EA:	Environmental Audit
DTM:	Digital Terrain Model
EAPP:	East African Power Pool
EARP:	Electricity Access Roll out Program
EDCL:	Energy Development Corporation Limited
EDF:	European Development Fund
EDPRS:	Economic Development and Poverty Reduction Strategy
EIA:	Environmental Impact Assessment
EMP:	Environmental Management Plan
eSWAP:	Energy Sector Wide Approach
ESWG:	Energy Sector Working Group
ESSP:	Energy Sector Strategic Plan
EUCL:	Energy Utilities Company Limited
FONERWA:	Rwanda National Green Fund
GGCRS:	Green Growth and Climate Resilient Strategy
GGGI:	Global Green Growth Institute
GOR:	Government of Rwanda
ICT:	Information & Communication Technology
KWh:	Kilo Watt/hour
LNP:	Liquid Natural Gas
LPG:	Liquefied Petroleum Gas
MININFRA:	Ministry of Infrastructure
MoE:	Ministry of Environment
MV:	Medium Voltage
MW:	Mega Watts
NDCs:	Nationally Determined Contributions

NGOs:	Non-Governmental Organizations
NST1:	National Transformation Strategy – Phase 1
OP:	Operational Procedures
PPA:	Power Purchase Agreement
RAPEP:	Rwanda Association for Environmental Practitioners
RDB:	Rwanda Development Board
RECO:	Rwanda Energy Corporation
REG:	Rwanda Energy Group
REMA:	Rwanda Environment Management Authority
REP:	Rwanda Energy Policy
RLMUA:	Rwanda Land Management and Authority
ROW:	Right-of-Way
RURA:	Rwanda Utility Regulatory Agency
RWFA:	Rwanda Water and Forestry Authority
SADC:	Southern Africa Development Community
SAPP:	Southern Africa Power Pool
SDGs:	Sustainable Development Goals
SE4ALL:	Sustainable Energy for All
SEA:	Strategic Environmental Assessment
SEO:	Contractor's Site Environmental Officer
SEO:	Site Environmental Officer
SRTM:	Shuttle Radar Topography Mission
USAID:	United States Agency for International Development
USD:	United States Dollars
VAT:	Value Added Tax
WAPP:	West Africa Power Pool
YESD:	Young Engineers Skills Development Program

Executive Summary

Overview of the Project

One of the strategic objectives of the National Strategy for Transformation (NST1) and its successors-EDPRS I & II- is to expand electricity access while at the same time improving quality of supply at the lowest possible cost.

To achieve the said objectives, the Government of Rwanda through REG/EDCL is planning to implement the "Transmission System Reinforcement and Last Mile Connectivity Project".

The overarching objective of this project is to reinforce the Rwanda transmission network and improve the rate of access to electricity supply for the people of Rwanda. The specific objective of the project is to strengthen the Rwanda transmission network and improve the rate of access to electricity supply especially for regional industrial parks, Bugesera Airport and several productive use centers.

In this regards, REG/EDCL invited through Request for Proposal No: 000001/C/ICB/2018/2019/EDCL aiming at selecting a Consulting Company for the Feasibility Study for Electricity Transmission Lines and Substations, for 5 new 110kV transmission lines:

1. The Kirehe – Kayonza project comprises 50 kilometers 110kV line and 2 Substations in Rwinkwavu and Kirehe area.
2. The Nyamagabe – Gisagara project comprises 40.71 kilometers 110kV line and 2 substations in Gisagara and Huye area.
3. Bugesera project comprises 18 kilometers 110kV line and 3 substations in Bugesera area.
4. Gabiro – Nyagatare Project comprises 26.7 kilometers 110kV line and 1 substation in Gatsibo area.
5. Rulindo – Gicumbi project comprises 1.5 kilometers 110kV line and associated substations.

The JV of IBC GROUP and CABIRA was selected to undertake the Feasibility Study for those projects. The present is the report on Environmental Impact Assessment (EIA) study of above mentioned 110kV transmission lines and substations.

The planned 110kV lines and Substations projects will specifically help to improve the quality of electricity supply in Rwanda and strengthen the backbone of the transmission network, thus providing additional capacity to cope with the growth of demand, under conditions of safety and quality in line with the requirements of the public electricity service.
The power system analysis of the transmission line and substation using PSS/E and/or DIgSILENT power system analysis models justified the project benefits in terms of technical loss reduction, transit capacity enhancement, safety (N-1), robustness, stability, etc. The simulations will mainly quantify these advantages and disadvantages. The project will generate quantifiable and non-quantifiable technical and economic benefits. As part of the economic analysis of the project, we will consider, among other things, the following benefits:

- Reduction of technical losses; because of better load distribution;

- The increase in energy supply, caused by the access to the network of previously unmet customers because of the capacity limit or the quality of delivery;
- Reduction of CO2 emissions, through access to the network of new customers.
- etc.

The increased rate of access to electricity will undoubtedly contribute to achieving the Objectives of the National Strategic Development Plans and Goals.

In this regard, the purpose of this ESIA is to provide the necessary information on the proposed project to guide decisions for the relevant institutions. The ESMP provides guidelines for the proposed project for it to be implemented in an environmentally sound manner, consistent with established environmental regulations. This ESIA Report also proposes mitigation measures to potential impacts that have been identified, which are required during implementation of the proposed project.

The specific objectives of the ESIA are to provide, inter alia:

a) A description and analysis of the prevailing environmental and social baseline of the Project Area and, paying special attention to the existing land uses, as well as fragile ecosystems and environmentally important areas, which include wetlands, forests and protected areas, in cognizance of applicable Safeguard Policies;
b) A review of policy, legal and institutional framework for the project, providing a summary of important policies, legislation, regulations and guidelines that are likely to be applicable to the project;
c) Consideration and documentation of inputs, concerns and suggestions of key stakeholders regarding the identification, analysis, assessment and mitigation of the potential environmental and social impacts of the proposed project through public consultations with relevant Government Ministries, NGOs / CBOs, community leaders and Project Affected Parties (PAPs);
d) Assessment of the direct and indirect environmental and social impacts of the planned project activities and paying special attention to direct and indirect gender impacts (access, utilisation and reducing the gender poverty gap) of the proposed project activities;
e) Environmental and Social Management Plan (ESMP) detailing mitigation measures for addressing the identified potential negative environmental and social impacts of the project and their timing vis a vis the construction and operational phases of the project; and
f) Monitoring plan with clear monitoring indicators, budget estimates and institutional roles for tracking the implementation of and compliance with the proposed mitigation environmental and social measures.

The project activities will consist mainly in the following:

- Construction of roads to access work sites;
- Clearing of the line's right-of-way;
- Site installation including construction of temporary campsites for construction activities of power lines and substations;
- Excavation works and other earthmoving and tower construction activities;

- Transportation of materials
- Stringing;
- Energizing;
- Commissioning;
- Maintenance (clearing) of the right-of-way during operation phase as a way for : permanent control of vegetation;

The identification of project alternatives includes the consideration of the proponent's 'preferred option', as detailed in the preliminary route design drawings. Other project alternatives are also identified through considering the following aspects:

a) Route alignment and/or location of project activities;
b) Designs of electrical infrastructure and what technology is proposed;
c) Use of alternative technology; and
d) Various implementation methods and techniques.

The above aspects are considered, and the alternatives identified for the project are :

Preferred Option: Overhead Power Lines

This alternative is as proposed in the feasibility study and detailed in the preliminary route designs received for the project, involving overhead power lines. The proposed line rooting and ROWs are selected among the various options, based on the dimness to satisfy the set criteria. No need to mention that environmental soundness was also equally considered than any other technical or financial considerations when selecting the line routings and ROWs.

In selecting the proposed route, the over-riding considerations were:

- the avoidance of environmentally sensitive areas and settlements,
- the minimization of the destruction of property and farms,
- easy accesses to construction and operation sites,
- low pollution level and
- favourable geotechnical conditions for the stability of foundations were also taken into account.

Alternative 1: Underground Power Lines
This alternative involves the construction and laying down of distribution lines in the ground. This option is very costly and result in extensive earthworks/trenching along the entire route proposed; this can be 3 times more costly than overhead lines. Underground cables are also typically damaged through other future activities involving earthworks. The construction and maintenance cost of this alternative is simply too high, and it is thus considered unviable and eliminated from further consideration in this assessment. Finally, it must be noted, that is in special circumstances, underground lines may be used for limited lengths, where this is deemed it is necessary. The related environmental and social impacts from such limited application of underground lines is considered negligible and is thus also eliminated from further assessment.

Alternative 2: Use of solar energy

The use of solar energy is a consideration, since the Project Area has good solar radiation. Solar energy, whether grid-tied or standalone, cannot however service high energy demands, such as for small industries like metal workshops, for instance. Other small and medium business enterprises that could make use of solar energy, would require sizeable systems, which require significant and upfront capital investment; a typical limitation in the establishment of such facilities. Typically, solar energy systems can be used for domestic applications, as well as installed in a hybrid application and tie into the national or local grid. In the case of the national grid, the necessary baseload required to ensure reliable and uninterrupted power supply, is in place through the national energy mix. Small and medium-size businesses that can afford to install grid-tie systems, would do so more readily if the surplus electricity produced could be sold back into the grid or allow for the accumulation of electricity credits. In the instance of this project, solar energy generation is not seen to be a viable option, as it will not be able to provide more cost effective and reliable electricity to trading centres in rural areas. This option is thus eliminated from the assessment. Such systems may in the future become more economically viable.

No Project Option:

The no-project Option will mean the status quo of the area remains and no occurrence of adverse impacts as well as positive impacts posed by the project implementation. The no project option will have the forgone costs and benefits, including:

- The targeted consumers will forgo improved electricity supply
- Generation of employment opportunities through expansion of business activities that would have been spurred by availability of electric power will not occur
- This will also hamper the country speed to reach the set target for universal electricity (100% access) by 2024 to electricity
- Continued of the current pressure for the use of biomass as a source of local energy with associated consequences in environmental degradation will continue to grow high…

Brief Description of the Project Sites and Major Environmental Challenges

The feasibility study was carried out in the following districts within the territory of Rwanda:

1. The Kirehe – Kayonza project comprises 50 kilometers 110kV line and 2 Substations in Rwinkwavu and Kirehe area. The project crosses three districts: Kayonza, Ngoma and Kirehe of the Eastern Province.
2. The Nyamagabe – Gisagara project comprises 40.71 kilometers 110kV line and 2 substations in Gisagara and Huye area. The project crosses three districts respectively Gisagara, Huye and Nyamagabe in the Southern Province.
3. Bugesera project comprises 18 kilometers 110kV line and 3 substations in Bugesera area. The project crosses three sectors respectively Gashora, Rilima and Juru in Bugesera District of the Eastern Province.
4. Gabiro – Nyagatare Project comprises 26.7 kilometers 110kV line and 1 substation in Gatsibo area. The project crosses 2 districts respectively Gatsibo and Nyagatare of the Eastern Province.

5. Rulindo – Gicumbi project comprises 1.5 kilometers 110kV line and associated substations. The project crosses 2 districts respectively Rulindo and Gicumbi in the Northern Province.

The project areas are located in the different parts of the country and enjoy the country's climate pattern, i.e. an equatorial climate tempered by altitude, characterized by mild, stable temperatures and moderate precipitations according to a cycle of four seasons with two dry seasons (January – February / June – August) and two rainy seasons (March – May / September – December).

These areas are part of transformed landscape by agricultural activities. No transmission line crosses directly any legally protected area. There are, however, several patches of eastern savannah vegetation and marshlands areas which are crossed by the transmission lines. The characteristic habitats that are crossed by the different lines are mainly the woodlands of eucalyptus and grevilleas trees, coffee and banana plantations, fields of other crops (maize, beans etc), as well as a few of marshlands and streams.

The width of the right of way and proposed route for the transmission lines complied with a number of common criteria. The routes studied were aimed at avoiding sensitive environmental elements and constraints in the land crossed. There is generally a right of way of 25 meters in which no other permanent structure is allowed. Outside this band within the right of way, all vegetation exceeding 4-5 meters in height will be eliminated including trees outside the right of

way, which represent a potential risk of falling onto the lines. However, several crops, which do not exceed a height of 4-5 meters, banana trees in particular, and compatible activities such as agriculture and livestock grazing shall be permitted in the right of way area. In addition to the ground area permanently required for the construction of the pylons (6.25 m^2 by pylon), other areas will be necessary for electrical sub-stations, tracks, access roads and camps for workers.

Area of Influence

The entire project and working footprint require for the construction of the infrastructure forms the direct impact area for the project, and falls well within the 25m Right of Way of the Power line. Construction and material storage yards must be located in village centers, with providing social mitigation measures contained within the ESMP. Broader direct impacts must be further considered, so the direct area of influence for the project is considered as the Project Area and falls within the total length of the different power lines. With a directly affected area of 136.91km km and 25m width ROW, this project directly influences various activities currently underway on the different areas. Taking the average population density for the concerned Districts it is estimated that the project will influence land use and livelihood activities of approximately between 300,000 and 400,000 people. With average population growth at 3.1% in Rwanda, and placing an ever-increasing demand on the provision of social services, the need to keep stimulating the local economy and placing ever-increasing pressure and value on natural resources.

Policy, Legal and Institutional Framework for the Implementation of the Project

This impact assessment aligns and complies with the national policy, legal and institutional policy framework, indicating across various sectors and fields of expertise, the requirement for the assessment and effective management of environmental and social impacts related to the construction of power lines and substations.

The table below indicate the relevant national policies. The purpose of each policy and response from this study are highlighted.

Table 1: National Policy Framework

No	Name	Purpose	Response
1	Vision 2050	Vision 2050 (with its implementation 7 year Strategy (the National Strategy for Transformation - NST1) aspires to take Rwanda beyond high income to high living standards by the middle of the 21st Century	The realisation of the project will improve on the chances of realisation of the Vision 2050 (through the NST1), with emphasis on the distribution of electricity to the community, that will in turn boost the process of industrialising the country, diversifying economic activities in rural areas and creating employment
2	The Rwanda Rural Electrification Strategy (2016)	This Strategy was developed with the objective of ensuring that Rwanda's households have access to electricity through the most cost effective means by developing programmes that will facilitate both the end users to access less costly technologies and increase private	This plan emphasizes the technical standards and materials specifications for distribution and construction, to be reviewed and adjusted to incorporate design efficiencies, reduce cost and facilitate operational reliability and extended life-spans; to be reviewed and updated with new 'best practices' on an on-going basis. In terms of social and

No	Name	Purpose	Response
		sector participation in the provision of these solutions	regional equity, the objective of the strategy is to ensure that rural electrification is widely accessible to the entire rural population, as part of the Government's objective to reduce poverty and deliver community and social services to the public. Entities responsible for implementing the strategy will assure that rural consumers are fairly treated, and that assistance is equitably accessible to less advantaged rural regions
3	The National Environment and Climate Change Policy (2019)	This Policy reaffirms the government's commitment to address climate change and its resolve to lessen the potential hardships that climate change may pose to the sustainable development of the country	Energy is mentioned as one of those sectors that the policy takes a key interest in. The policy is to provide guidance and direction in addressing the problem of climate change, while enabling the country to adapt and mitigate the effects of climate change. This study provides for an assessment of the impacts of the project measured against criteria for sustainability, including health, quality of life, long-term sustainable socioeconomic development, sound environmental management and optimal use of natural resources. The implementation of the project will result in reduced vulnerability and increased livelihood potential
4	The Rwanda Energy policy (2011) / The Rwanda Energy Sector Review and Action Plan (2013) / Energy Sector Strategic Plan (2018/19 – 2023/24**)**	The purpose of the Energy Policy is to respond to the Rwandan population's energy challenges and needs for economic and social development within a viable and sustainable environmental framework.	This study recognizes that the generation, provision and distribution of energy in Rwanda is a key factor for economic growth and must be implemented in a sustainable manner, avoiding negative impacts as far as is possible, and where not possible reducing such impacts through effective mitigation. The policy recognises the need to mitigate both physical, social and environmental aspects.
5	The National Biodiversity Policy (2011	This Policy recognizes that that Rwanda's viability is dependent on the conservation of its biological resources as these resources contribute significantly to livelihoods, food sovereignty, health, the environment, cultural diversity and the economy.	This study is focussed on how to best protect and conserve the remaining biodiversity and natural ecosystems in the Project Area
6	The National Wetlands Management Policy (2015	The policy specifically calls for the application of EIA procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed	This study identifies environmentally sensitive wetlands that will be impacted during construction and details how these impacts need to be optimally managed to protect wetland resources.
7	The National Gender Policy, 2004	The general purpose of the National Gender Policy consists	This study focuses on and emphasises the importance of

No	Name	Purpose	Response
		in clearly defining the mainstreaming process for gender related issues into all development sectors, to promote gender equality and equity in Rwanda	considering gender aspects in the design and implementation of the project.
8	National HIV/AIDS Policy	This essential health policy aims to provide a framework for a multi-sectoral response to HIV/AIDS in Rwanda's world of work and applies to all current and prospective employees and workers in the public and private sectors.	This study focusses on the issue of HIV/AIDS and how to address this key issue in this project
9	National Water Policy	This policy must ensure the sustainable management and development of water resources in a coordinated and integrated manner to secure and provide water of an acceptable quality and quantity for all social and economic needs.	This study recognises that the protection of water resources through the prevention of water pollution from erosion, siltation, oil spills, creosote and sanitary wastes, all of critical importance

The proposed project and this study must comply with the laws of Rwanda. The relevant laws are described below and form the legislative framework within which the impact assessment must be conducted, and the project must be implemented.

Table 2: National Legislative Framework

No	Name	Purpose	Response
1	Constitution of the Republic of Rwanda, 2015	The Constitution of Rwanda provides for, inter alia, matters pertaining to environment, natural resources and the and the sustainable development, including energy resources and the right of every Rwandan to a clean and healthy environment (Art 22) and the right to property (Art 34).	This study assesses the project in a manner that signifies the effect it will have on both the natural and social environment and to best ensure the protection of sensitive environmental resources and social aspects.
2	Law on Environment (N°48/2018 of 13/08/2018)	This law defines key principles on which the environmental protection is based on, and including: Precautionary principle (Art 3); Principle of environmental sustainability (Art 4); Polluter pays principle (Art 5); Principle of information dissemination and incentives for environmental conservation (Art 6); Principle of cooperation (Art 7). Art 30 of this law specifies that a Ministerial Order establishes the list of projects that must undergo	This study complies with the requirements for impact assessment and the consideration of the required environmental and social criteria.

No	Name	Purpose	Response
		Environmental Impact Assessment (EIA) and defines also its process and procedures and delivery of authorization before project implementation.	
3	Ministerial Order establishing the list of Projects that must undergo Environmental Impact Assessment, Instructions, Requirements and Procedures to conduct Environmental Impact Assessment in Rwanda (No 001/ 2019 of 15/04/2019)	The Ministerial Order defines environmental impact assessment as: systematic process of identifying environmental, social and economic impacts of a project, before a decision of its acceptance is made, Art 3 and 4 specifies respectively the works, activities and projects that must undergo a full environmental impact assessment (listed on Annex I) and those that must undergo a partial environmental impact assessment (listed on Annex II).	This study complies with the requirements for impact assessment and the consideration of the required environmental and social criteria.
4	Law governing electricity in Rwanda as modified to date (No 52/2018 of 13/08/2018 – modifying law No 21/2011 of 23/06/2011)	This Law governs activities of electric power production, transmission, distribution and trading within or outside the national territory of the Republic of Rwanda and establishes a system of authorizing licenses for transmission, distribution and sale of electric power (Art. 5)	This project makes provision for the expansion of rural distribution lines to improve access to electricity.
5	Law governing land in Rwanda (N° 43/2013 OF 16/06/2013)	This Law determines modalities of allocating, acquisition, transfer, use and management of land in Rwanda. It also establishes the principles applicable to rights recognised over all lands situated on Rwanda's national territory and all rights united or incorporated with land, whether naturally or artificially	This study considers the ownership and use of land, specifically taking note of land tenure and related compensation matters
6	Law determining the management and utilization of forests in Rwanda (Nº47bis/2013 of 28/06/2013)	The law distinguishes state and private forests. Art 5 lists the following categories as states forests: protected forests; production forests; Forests reserved for research.	This project is not located in any Forest Reserve. Yet the study considerers remaining natural forests and trees and addresses how these can be protected, as far as is possible
7	Law governing biodiversity in Rwanda (N° 70/2013 of 02/09/2013)	The purpose of this Law is to determine modalities for management and conservation of biological diversity within Rwanda (Art 1). Under this Law, Art 14 stipulates that an Order of the Minister shall set out a national	This project is not located in any other Protected Areas. Yet the study considerers flora and fauna resources and addresses how best to protect such remaining resources

No	Name	Purpose	Response
		list of ecosystems that are threatened and in need of protection and their location	
8	Ministerial Order establishing the list of Protected Animals and Plants Species in Rwanda (No. 007/2008 of 15/08/2008)	According to this Ministerial Order, the species of protected animals are classified into: Mammals, birds, and reptiles (Art 1) and are listed in Appendix I of this Ministerial Order. These animals should not be hunted except when there is prior authorization from competent authorities (Art 2)	This project is not located in any other Known habitat for protected species. Yet the study considerers flora and fauna resources and addresses how best to protect such remaining resources
9	Prime Ministerial Order determining the responsibilities, organization and functioning of Committees in charge of the environment conservation and protection (Nº 126/03 of 25/10/2010)	The environmental Committees are established at Provincial, City of Kigali, District, Sector and Cell levels. The responsibilities of these Committees include (Art 3): Ensuring the implementation of the laws, policies, programmes and plans relating to the protection, conservation and promotion of the environment in Rwanda; Monitoring issues relating to awareness raising of the population on environment protection and proper land use; and Ensuring that persons who destroy the environment are pursued by the competent institutions	This study recognises the importance of involving environmental actors in the in the assessment and implementation process of this project
10	Instruction issued by the Rwanda Environmental Management Authority (REMA) and governing Inspection Process in Environmental Matters (No 001 of 10/01/2020)	Art 2 of this Instruction defines the Inspectors as staff in charge of environmental management in the Authority in charge of environmental management, in the City of Kigali and in all Districts. Art 3 describes the mission of an inspector as: Ensure that all projects, activities and products conform to applicable laws and to environmental standards; Prepare inspection report and advise his / her institution on measures to be taken; and Provide the inspected person with technical recommendations related to environmental management following the inspection findings	This study recognises the importance of involving environmental actors in the in the assessment and implementation process of this project

The institutions involved in planning, financing and approval of the project, either directly or indirectly, all have a role to play in the effective management of environmental and social impacts related to the project, as detailed in following Table.

Table 3: National Institutional Framework

No	Name	Mandate	Responsibility in the Project
1	Ministry of Infrastructure (MININFRA)	MININFRA is responsible for four sectors: transport, energy, water and sanitation, urbanization-human settlements and housing. For the energy sector, MININFRA is in charge of the formulation, monitoring and assessment of policies and programs. Its mission is also to ensure the existence of a proper power generation capacity producing cost-effective energy, and to initiate programs to increase access to affordable energy and services. MININFRA ensures that quality standards and norms are implemented and is responsible for human resource capacities in the sector	Compliance with Energy related policies and regulations, capacity building, resource moblisation; orient and supervise the functioning and management of public institutions, agencies and companies under the Ministry", including the Rwanda Energy Group (REG) and its subsidiaries
2	Rwanda Energy Group Ltd (REG)	REG's mandate focuses on improving the planning and implementation of energy projects appropriate to meet the energy supply requirements and efficiently operating the supply infrastructure to sustainable deliver reliable and affordable energy in the household and commercial usage	REG is the overall Authority responsible for the implementation of the project
3	Energy Development Company Limited (EDCL)	EDCL is the REG's subsidiary in charge of developing new generation, transmission and energy access development projects. EDCL's mission is to develop new energy resources locally, bolster investment and develop projects in this field. It is also responsible for reviewing the power master plan and defining a least-cost power development plan. EDCL is therefore also in charge of regional power integration with neighboring countries and power pools	Technical coordination for planning and implementation of the project
4	Rwanda Environmental	Under the supervision of the Ministry of Environment, REMA	REMA has a cross-sectoral mandate to ensure that proper environmental safeguards are

No	Name	Mandate	Responsibility in the Project
	Management Authority (REMA)	reserves the legal mandate for national environmental protection, conservation, promotion and overall management, including advisory to the government on all matters pertinent to the environment and climate change	observed in the planning and execution of all development projects; REMA carries out its own monitoring largely through Inspectors and District Environmental Officers
5	Rwanda Development Board (RDB)	RDB is a government department that integrates all government agencies responsible for the attraction, retention and facilitation of investments in the national economy. RDB was established in 2009 to coordinate, spur and promote national economic development RDB deals also with issuing of EIA Certificate for investment projects	Reception of the ESIA Report for review and issuance of environmental compliance (EIA) Certificate
6	Rwanda Standards Board (RSB)	RSB was established with a mandate to undertake all activities pertaining to the development of Standards, Conformity Assessment and Metrology services in the country. It is the only body with powers to define and posses national standards	Ensuring the project's works, materials, equipment etc. are in conformity with established standards for electricity transmission
7	Rwanda Association of Professional Environmental Practitioners (RAPEP)	The Rwanda Association of Professional Environmental Practitioners (RAPEP) is a professional association comprising environmental practitioners licensed to operate in the Republic of Rwanda and recorded on its register; and established by Law No 36/2016 of 08/09/2016	Issuing License to Environmental Practitioners to undertake Independent EIA study, and ensure the work is done with required adequate professionalism; carry out environmental audit as required by the competent authority,
8	Energy Utility Corporation Limited (EUCL)	EUCL is the subsidiary utility in charge of the day-to-day operation of generation facilities, transmission and distribution networks and the sale of electricity. EUCL plans the transmissions and distribution grids. Its current focus is geared toward consumer satisfaction, demand side management, technical and non-technical loss reduction and energy efficiency	Management and distribution of electricity once the project is completed
9	Rwanda Utilities Regulatory Agency (RURA)	RURA) was established with the mission to regulate certain public Utilities, namely	RURA will ensure that, the tariffs costing of energy from the planned project will be in accordance with

No	Name	Mandate	Responsibility in the Project
		telecommunications network and/or telecommunications services, electricity, water, removal of waste products from residential or business premises, extraction and distribution of gas and transport of goods and persons	its set standards and tariffs.
10	District Authorities	District is headed by a Mayor who is the political head and responsible for all activities in the District. The Mayor is aided by a District Executive Secretary and other Vice Mayors in charge of various technical matters (District development, social affairs).	The proposed project falls within jurisdiction of several Districts across the country. The relevant Technical District personnel directly involved with the project may include the Vice Mayor for Development, Social Affairs, Environmental Officer, District Planner, Community Development Officer, Health Officer, Forestry Sector Manager, Agricultural Officer, D0istrict Water Officer and District Engineer.

Role and Responsibilities for the implementation of the ESMP

The EMP implementation is the responsibility of different stakeholders. Therefore, the organizational structure is presented below.

Surveillance and monitoring must be carried out at several levels of responsibility. Contractors and more specifically environmental surveillance officers of those firms (SEO) must have a record of measures introduced. Copies of such a record must be transmitted to the Promoter, the Independent Environmentalist (EI), local authorities and ministries and agencies responsible for supervision.

Environmental parameters that will have to be monitored are, inter alia:

- Monitoring of complaints and measuring the stakeholder satisfaction;
- Quality of water and air;
- Nuisances : noise, dust, odors, wastes, etc.;
- Soil erosion and contamination;
- Tree removal and clean-up of the ROW;
- Rehabilitation of sites (campsites, farmland, access roads).

Regarding organizational responsibility, the implementation and ensuring of good functioning of the ESMP are the responsibility of REG as the Promoter. REG is responsible for the project realization and must ensure that environmental aspects are taken into account during the project's implementation phase.

Moreover, REG shall appoint an Environmentalist (EI) in order for him to check the implementation of measures, their efficiency, and determine if impacts expected indeed

appeared. That expert will have to report on a regular basis to the relevant ministries and environmental protection agency.

The Contracting firm will have to appoint a Site Environment Surveillance Officer (RSE). That person will have to collaborate actively with the EI in the implementation of mitigation measures at the site.

REG must also ensure that there is a Project Implementation Unit (UIP), an independent organ in charge of collaborating in the EMP operational implementation. Moreover, in addition to information and awareness raising activities, the UIP will monitor every practical aspect of the EMP.

Governmental institutions and local administration are involved in the implementation of the EMP. Ministries in charge of environment, forestry and wildlife and their agencies (REMA), as well as their decentralized units, will be tasked with ensuring regular control of activities and compliance with the standards.

Creating a Project Implementation Unit (UIP)

As demonstrated in the consultations for this study, some households and village leaders feared they would not be or be insufficiently compensated. These fears stem in particular from their past experiences.
It is recommended to create a Project Implementation Unit (UIP) in order to ensure an independent supervision of the implementation of measures for informing populations, compensation calculation and implementation of environmental mitigation measures . The members of this unit must come from independent agencies REG, and including Ministries of Environment, Land and Agriculture in order to be able to verify the implementation of the measures of the EMP.

Furthermore, it is recommended that the Coordinator of the UIP is a neutral person from an NGO or a private consultant, to reassure people about the independence of that supervision. The UIP is also responsible for receiving complaints from affected households and communities and find common ground with leaders of the PMU and to report it. In addition, the UIP has the responsibility to report to the government agencies and the financer as to its assessment of compliance with environmental standards, implementation of mitigation and compensation measures, and finally about the social, economic and environmental situation of communities and households affected by the project (PAP).

Major and moderate environmental and social impacts

Environmental impacts of the installation of transmission lines were assessed by using data collected during field investigations, from data collection in offices of ministries and other institutions, review of relevant documents, databases, maps and satellite imagery, as well as consultation with different partners interested in the project, and meetings with the population living in the project area. The following are the major and moderate impacts on the selected environmental components:

- **Positive Impacts**

With regard to social impacts, the study elucidated that positive social impacts will result from the new (or improved) electricity supply, which allows economic development and improvements in living conditions.

The overall positive social impact of the construction of 110kV Lines and Substations in Rwanda can be anticipated by the economic development of the handicraft and especially the agro-business sector. 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. Supply of pumped water will be facilitated and there will be safer and more efficient operation of key services, through electricity access to villages along the transmission and distribution lines served.

The possibilities of an Electricity Supply Project linked to Poverty Reduction can be seen in an increased income, an enhanced productivity and quality of life, a contribution to Human Development, influenced migration, and by a contribution to security.

During the preparatory and construction phases of power lines are:

(1) the creation of financial income as a result of the temporary jobs that will be created for local workers from the sectors/districts concerned by construction works and compensatory reforestation activities. It is estimated that up 1000 persons will be directly employed by the project for construction works and receiving regular salaries; and
(2) the creation of financial income for local traders including women selling food items along the construction sites.

During the operation phase, there will be:

(1) Improvement of the living conditions of nearly 10,000 households and 34,000 citizens because of access to electricity in homes and public lighting for the localities' along main roads. To that should be added the opportunities provided to use TV sets, with the benefits they offer in terms of information, education and entertainment for the population.
(2) There will also be improvement of study conditions for students and school children, following the electrification of schools within the villages concerned.
(3) There will be better functioning conditions of health centres and pharmacies, thus enhancing patient care. A total of 16 health centres are concerned for the time being. They could benefit from equipment that will make them more efficient;
(4) Improved performance of from workers of the 36 public and private services identified in the villages ;
(5) The creation of new trading opportunities for men and women in the artisanal sector (welding, vulcanization, hair dressing, catering, …);
(6) Development of commercial activities in the 58 localities concerned, as a result of better functioning of shops.

- **Negative Impacts**

During the preparatory and construction phase of power lines, negative impacts are foreseeable, but can be mitigated using appropriate measures. These especially are:

(1) Loss of land and crops, even though temporary and limited, following expropriations necessary for the installation of pylons, lines and other equipment linked to the electric power transmission network. People and properties that will be affected by the construction of the power lines and substations are detailed in the table below. Appropriate compensation for cases of expropriation will be provided to project affected persons. A Compensation and Resettlement Plan has been prepared for this purpose.

Table 4: Number of people and properties that will be affected by the project

Specific information		
10	Number of people affected by the project (PAPs)	7,980
11	Number of Physically displaced	1,600
12	Number of economically displaced	6,380
13	Number of affected households	1,995
14	Number of females affected	2,633
15	Number of vulnerable affected	399
16	Number of major PAP	6,097
17	Number of minor PAP	1,883
18	Number of total right-owners and beneficiaries	1,247 HH
19	Number of households losing their shelters	400
20	Total area of lost arable/productive lands (ha)	336.75
21	Number of households losing their crops and/or revenues	1,595
22	Total areas of farmlands lost (ha)	235.9
23	Estimation of agricultural revenue lost (USD)	486,578
24	Number of building to demolish totally	400
25	Number of building to demolish totally at 50%	0
26	Number of building to demolish totally at 25%	0
27	Number of tree-crops lost	27,600
28	Number of commercial kiosks to demolish	0
29	Number of ambulant/street sailors affected	0
30	Number of community-level service infrastructures disrupted or dismantled	8 drying coffee plattforms
31	Number of households whose livelihood restoration is at risk	0

(2) Construction work for the lines and pylons will have impacts on the soils, the excavation of which could increase the process of erosion, plus the potential risk of contamination from spillages of oil or other contaminants.

(3) The construction phase will affect the air quality and generate noise levels higher than those currently present in most of the sectors. This temporary impact will disappear with the end of the construction phase.

(4) The risk of HIV/AIDS propagation as a result of the arrival of foreigners in the villages and possible occurrence of unprotected sexual relations with women of the localities concerned. To address this risk, appropriate IEC actions on HIV/AIDS are recommended in the various localities.

(5) The risk of accidents during clearing and excavation works and other installations of equipment and stringing of power lines. Adequate signaling of construction sites and the

provision of workers with appropriate safety equipment such as helmets, gloves, safety belts and safety shoes are proposed to minimize this risk.

(6) Loss of natural herbaceous, shrubby and savannahs vegetation - and consequently of small wildlife habitat – because of works to clear the rights of way. During construction, the requirements to free the right of way and maintenance work on the lines will lead to the removal of tree cover. The growing of certain trees such as banana trees, which do not exceed a height of 4 to 5 metres, will, however, be allowed. Contractors will also ensure that their workers comply with forestry and wildlife regulations.

(7) Risks of pollution of surface water as a result of poor storage of hydrocarbons and waste oils from construction site machines. To mitigate this risk, contractors shall ensure that construction site machines are maintained and their oil changed in impervious areas designed for this purpose. Waste oils will be collected and stored in waterproof tanks to be provided for, from the start of works.

(8) During the equipment operation phase, there is the risk of accidents by electrocution. This risk will be mitigated through IEC actions on safety rules and measures for newly constructed electrical installations (lines and transformer stations) as well as electrical appliances that will function using this energy. IEC sessions will include aspects such as best practices in electricity consumption as well as prohibitions and penalties for violations (illegal connections, manipulation of meters).

(9) Accident risks also concern specialized workers in charge of equipment maintenance. They must be provided with appropriate safety equipment in use for their profession: helmets, gloves, safety shoes, safety belts…

(10) Health risks for the population because of the electromagnetic field of power lines and transformers. This risk is minimal in the case of medium voltage lines.

The main legal and regulatory instruments governing the environmental management in Rwanda are quoted and an analysis of the legal and administrative framework related to resettlement and compensation measures are elaborated in the context of the Resettlement Action Plan.

REG will be responsible for the payment of the compensations. It is the requirement of both the World Bank and the AfDB that no civic works for project implementation can begin if the compensations have not been provided for.

Consultation activities and assessment of social impacts

The purpose of stakeholder consultation is to assess and plan, together with the views and insights brought into the planning process by stakeholders, if the project should go-ahead, what measures to put in place and what needs to be monitored and reported upon.

Key stakeholders have been identified and initial discussions held with decision making bodies, key stakeholders, sector institutions and specialist experts were made on the very concepts and nature of the proposed project, giving emphasis on levels of public participation, role of key stakeholders and joint contributions of these actors to the success of the project. In addition, the

scope of the proposed project and possible means of maximizing local communities' social, economic and environmental benefits from the project implementation were underlined. Key stakeholders identified for consultation during preparation and implementation of Resettlement Action Plans include but not limited to the following:

At national level:

- Ministry of Environment (MoE);
- Ministry of Infrastructure (MININFRA);
- Rwanda Environment Management Authority (REMA);
- Rwanda Standards Board (RSB);
- Rwanda Development Board (RDB);
- Rwanda Land Management and Use Authority (RLMUA)

At local level:

- Local Government Officials (Districts and Sectors);
- REG District Branch managers and
- Potential Project Affected People (PAPs).

Stakeholder consultations were carried out during the ESIA process, to ensure that all stakeholder concerns are incorporated into project planning and implementation. This is in line with the statutory consultation requirements under AfDB environmental and social safeguards policies, as well as the ESIA Regulations for Rwanda. Consultations were conducted at National, District and Local levels. Consultations were held along the entire lengths of the power lines corridors during the period of 21/03 till 14/05/2020.
Stakeholder consultations have been conducted according to the Stakeholder Engagement Plan and has included various consultation methods. The Stakeholder Engagement Plan, included in Appendix 1 of this report, specifically details the stakeholder consultation process conducted, as well as the list of consulted stakeholders the details of their views.

Generally the stakeholders expressed their views The main findings of this exercise were:

- strong support for the project and high excitement about the opportunity of rural electrification
- significant expectations in terms of financial benefits and employment, in particular, and contracts during the construction;
- Perceptions and awareness of the public, in relation to the proposed project: Consulted Communities in the project area were not aware of the project, but they agree and acknowledge the excellent/considerable importance of the project;
- Land and soil protection issues: Given that land is not sufficient, concerns were focused on increase in land parcelling. Fragmented lands loose their value and, at that time, they would like to take into account all lands of a household whose area of plots in the ROW is higher than that of residual lands;
- Degradation of woody savannah's biodiversity: Those savannah are located in eastern plateau (Gatsibo, Bugesera and Kirehe Districts). Those savannah are habitats for flora and wildlife, among which mammals and reptiles as well as endemic butterflies and a large diversity of birds. Those ecosystems are already under various threats, such as

wood harvesting, bushfires, clearing in search of new farming land, settlement of habitat, search for pasture land and animal poaching, and the concern is that the project would accelerate their degradation.

- Environmental education for the population: Consulted authorities showed their satisfaction with the project for environmental education opportunities for all the environment components. The project would be a major asset for educating the population on environmental protection programs given that at each district and sector, there is one person in charge of environment

Environmental and Social Management Plan (ESMP)

Mitigation measures have been identified through considering each impact, especially what can be done about the high and medium negative impacts. The mitigation are synthesised and presented as a final set of mitigation measures in the Environmental and Social Management Plan (ESMP) in Chap IV. 4.

The specific measures addressing each significant and moderate impacts are listed below:

Preconstruction Phase
Community expectations from the project

- To organize workshops for information and awareness raising for authorities, community-based organizations/ NGOs and communities at all levels (national, districts and sectors)
- To produce and distribute/disseminate information tools by taking into account concerns of communities in all communication channels.

Planning of environmental management requirements

- Preparation of Contractor's environmental management plans.
- A drainage and erosion control plan;
- A rehabilitation plan for disturbed areas; A waste management plan;
- An intervention plan in case of spillage of contaminants;
- A fuel and other hazardous materials management plan.

Authorization for clearing ROW and license to borrow construction materials

- To obtain authorizations from owners and authorities before proceeding with clearing of ROW.
- To use only authorized quarries and recognized suppliers of sand, gravels and quarry materials. To respect all requirements of authorizations.
- To apply by writing for an authorization to operate a borrowing from landowners with prior commitment to rehabilitate borrow areas to RSE.

Sources of supply of construction materials

- To identify and use quarries recognized by State (quarry materials, gravels and sands).

Establishment of worksites and temporary construction site areas

- Before installing worker camps or other work areas, the Contractor shall submit its location to RSE for approval. The RSE will ensure that the landowner has given his agreement and that the environmental management measures will be introduced.
- To grant relevant landowners compensation for their assets and rental of land for duration of works.

- To prepare development plans for basic campsites and other construction sites and have them approved by SEO.
- To plan safe discharge of all wastes, avoid spillage, leakages of soil pollutants and water resources of receipt tanks.
- The Contractor will e responsible for payments of all costs generated for clean-up of pollutions caused by his activities and will have to fully compensate relevant people.
- Supply drinking water and maintain its quality and ensure sanitation and discharge of wastes from construction sites.
- Consider facilities of access to existing public infrastructure (roads, drinking water supply, electricity and communication cover.
- Consider topography and site soil quality, its location in regards with a wetland (250m).
- Provide to SEO for approval a campsite plan with indications of its limits and an environmental management plan for site (capacity of campsite in number of people, solid waste and wastewater, drinking water and electricity supply, etc.).

Construction Phase

Soils erosion and compaction

- Restrict the activities to the minimum possible;
- Use appropriate machinery and/or protective
- boarding during soil stripping;
- Remove and stockpile topsoil, subsoils and any parent material separately;
- Use the stockpiled material in the origin area;
- Topsoil storage periods shall be kept to a minimum

Changes of landscape - Visual impact

- Use paint with colors that match the environment to minimize visual impact of the structure;
- Retain a belt of trees/bush around facilities built to minimize visual impact.

Noise and vibration

- Restrict construction and operation of heavy machines to daylight;
- Ensure noise emissions are kept within the
- Rwanda standards;
- Reduce needed truck movements by careful planning of needs of construction material;
- Regular and effective equipment maintenance in order to ensure all machinery is in good working order and use does not generate excess noise/vibration.

Loss of vegetation cover and plant diversity

- Align the excavations to follow existing parallel
- water pipeline in order to minimize the loss of vegetation cover;
- In areas of dense vegetation cover, the removal of vegetation must be restricted to the minimum necessary width;

Disturbance and mortality of terrestrial fauna

- Restrict construction activities do the daylight;
- Inspect the area to be cleared for any terrestrial fauna before bush clearing and digging
- Protect any trench left overnight with a net fence to block fauna from being trapped inside;
- Capture and release fauna away from the direct influence zone (including species trapped in the trenches);

Liquid waste management

- All waste water must be contained on site;
- Consider reuse, recycling, and treatment of process water where feasible
- The quality and quantity of waste water discharged in the environment, including storm water be managed and monitored and be of adequate quality prior to release;

Air Quality Management

- Minimizing dust from open area sources, including storage piles;
- Dust suppression techniques should be implemented, such as applying water or non- toxic chemicals to minimize dust from vehicle movements,
- Managing emissions from mobile sources,
- Avoiding open burning of solid.

Solid wastes management

- Waste Prevention: Processes should be designed and operated to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes generated
- Implementation of recycling plans.
- All the solid waste should be collected; the biodegradable organic material composted properly on site for manure production and the non-biodegradable disposed of in a public landfill;

Management of Hazardous Materials and Oils

- Waste separation must be conducted on site;
- Develop policies and programmes for waste management, storage, recycling and minimisation;

Safety and security

- Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site

Health related issues due to dust emissions

- Use of wet processes;
- Use of Personal Protective Equipment

Operation Phase

Animal biodiversity

- During maintenance and ROW clearance, ensure that vegetation is cut up to a certain height that allows animals to cross on both sides. Leave in place the shrub layer.
- To undertake regular monitoring of threatened species (birds, monkeys) of the area during operation of line.

Vegetation control

- The ROW will require regular maintenance to control vegetation of the ROW under conductors and in substations
- Maintenance operations will have to be restricted to the ROW and should not damage the surrounding vegetation.
- The manual or mechanical control of vegetation within the ROW must be encouraged. To undertake tree removal mechanically and not to use phytocides to control vegetation.

- To sign a maintenance contract with a local association/cooperative in order to ensure mechanical control of vegetation. Preferably, people affected by the project will be considered in priority

Mitigation of Social impacts

Land acquisition will be carried out in accordance with the prevalent laws of Rwanda and as per the AfDB guidelines on resettlement, which require identification and quantification of any impacts on land-based livelihood, and adequate compensation to landowners and people relying on the land for their livelihood. The compensation would be paid before the start of works as per the resettlement plans. The effective payment of the compensation would be one of the loan conditions. Another method to mitigate the impact of land acquisition by the project is to allow continuation of agriculture within the ROW on conditional terms and in compliance with strict vegetation management guidelines.

The mitigation plan will take a rigorous approach to control the spread of STDs: health education programs, control of informal sector activities near the project site and distribution of condoms.
No sites of cultural and / or spiritual significance were identified on or in the immediate vicinity of the site. There are no national legally protected cultural heritage areas/buildings on the site and in the surrounding areas. Where there are accidental “chances of findings” of some archaeological artefacts on the line routes, construction workers and surveyors shall report to the project’s monitoring unit that will then report to the respective national authority for further investigations.

The costs for putting the environmental management plan into place are summarised in table 1. The total costs or all the measures to be taken amounts to 208,653,000 Rwandan Francs, which includes 2% for administration expenses and 10% for unforeseen expenses.

Specific EHS clauses to be part to work contract
Employment

- Labour can be employed from along the route, with strict adherence to international labour laws and local cultural sensitivities, as identified during consultations, focusing on gender equity and child protection and within the parameters of the ESMP.
- To minimise the negative social behaviour, it is recommended that, where necessary and feasible, local labour force from within the immediate communities be recruited to minimize housing pressures as well as, social conflicts in the Project Area. For purposes of recruiting the local labour force, the Contractor should work closely with local leadership to identify suitable persons for employment. In addition, the Contractor needs to liaise with the local authorities of the concerned Districts on matters of local labour recruitment arrangements

Social cohesion or disruption and Influx of people

- The Contractor should be monitored independently and regularly to ensure strict compliance with contractual obligations, including adherence to stipulated standards of conduct and behaviour of construction workers.
- The Contractor needs to sensitise workers in cultural values and norms of the area and the identified sensitivities.

- The Contractor needs to work closely with the existing law enforcement agencies in the areas of the project (local authorities and the Police) to help address potential issues of crime in the project. Local authorities require support to handle the increased cases of indiscipline and conflict, brought about by the increased population influx, and any disputes that are likely to ensue.
- Issues of security should be handled hand-in-hand with the local Council administration, to ensure that suspicious non-known members of the area who are also not part of the project, are rounded up to avoid disrupting the security of the area.
- The project should in addition have its own security system as it is very common to find the local security organs conniving with the bad characters to exploit projects.
- A comprehensive HIV/AIDS Awareness and Management Plan must be implemented throughout and for the duration of the construction phase, with post-completion monitoring and reporting to REG and REMA, collaborating with NGOs and CBOs, as possible.

Human health

- A key consideration for the proposed project is the ability to effectively involve key stakeholders in a realistic and positive participatory process to combat gender violence and the abuse and mishandling of women and children on such government infrastructure projects and the Contractor must present a plan to address such.
- A comprehensive HIV/AIDS Awareness and Management Plan must be implemented throughout and for the duration of the construction phase, with post-completion monitoring and reporting to REG and REMA, collaborating with NGOs and CBOs, as possible.
- Sensitisation of communities to be conducted and include electromagnetic fields, accidental electrocution, exposure to hazardous waste materials like fuels, oils and timber offcuts with creosote and/or CCA, safe levels of exposure and related impacts, to avoid speculation.

Cultural objects (PCRs)

- If any religious institution along the site it going to be directed impacted upon by the proposed line, then specific discussions during final planning can be conducted.
- Implement the Chance Finds Procedure, if any physical heritage of importance is found during the implementation of the project.

Gender impacts

- Conducting appropriate sensitisation on gender issues at all levels within the Project Area and creation of awareness on the responsibility of all concerned during the various phases of the project to address specific gender concerns. This should entail consultation with both women and men in the Project Area and within the construction teams.
- REG and the Contractor should ensure that:
    - Effective gender responsive and equality activities under the proposed project are duly defined and implemented through participatory engagement;
    - The quantifiable and none quantifiable, gender and social mitigation measures related to direct and indirect impacts are achieved; an
    - A social specialist is deployed on the project to oversee among others, gender mainstreaming in the project cycle, is implemented.
- HIV/AIDS awareness campaigns must be regularly conducted for workers and local communities, as well as activities promoting access to health services, treatment and counselling.

Vulnerable groups

- A Child Protection Plan will be developed and provided to all the Contractors and school management to discourage the Contractors from using children as labourers. In addition, Contractors will be required to avoid employing workers who are below eighteen years old. They will also be required to keep records that show the ages of their workers.
- Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 116. The existence of the hotline can be displayed throughout near the construction site and in the community at large.
- The Contractor should ensure that mechanisms for close monitoring of worker's behaviour/conduct are in place e.g. Contractor could discreetly engage the police to identify anonymous informers from among the workers to monitor and report any negative behavior by the workers including child abuse related misconduct, display a call line or suggestion box where the community can provide feedback on workers behaviour.
- REG and the Contractor should ensure that all local leaders and women/child representatives are fully oriented to the labour force related risks for children engaging in construction related activities.
- Talks with the Contractor and his workforce by relevant officials (including the police) on child protection should be encouraged and appropriately scheduled, including continuous popularisation of the child help line 116. Parents/guardians should be sensitised and held accountable for children leaving and arriving home before dark.
- Conducting appropriate sensitisation on gender issues at all levels within the Project Area and creation of awareness on the responsibility of all concerned during the various phases of the project to address specific gender concerns and especially as they relate to women. This should entail consultation with both women and men in the Project Area and within the construction teams.
- HIV/AIDS awareness campaigns for workers and local communities and activities promoting access to health services, treatment and counselling.
- REG and the Contractor should ensure strict compliance with the provision of relevant safeguard policies with respect to persons with disabilities. REG and the Contractor should ensure that there is full and effective participation of persons with disabilities and other vulnerable groups, like children and through representative organisations, in all phases of the project, including monitoring and evaluation.

Human safety

- Measures to prevent and control OHS issues during the construction, maintenance and operation of the project should adhere to established national and international OHS guidelines that are specific for electricity distribution line projects. These measures should also have site-specific targets and an appropriate timetable for achieving them, as related to:
    - The Contractor should have on site an Occupational Safety and Health Policy and Action Plan addressing workers and PAPs on occupational safety and health issues, workplace conditions, welfare, accidental electrocution, hazardous waste management, general safety requirements, fire preparedness, machinery, plant and equipment, etc. in line with the Occupational Safety and Health Act, 2006; The Contractor should conduct HSE sensitization with PAPs directly affected by the project

  - The Contractor should have HSE induction for all workers, and undertake daily tool box meetings prior to works; and
  - Workers should regularly be taken through safety drills and emergency preparedness training allowing for quick and efficient responses to accidents that could result in human injury or damage to the environment.
- The Contractor should involve local leaders in labour recruitment to ensure that people hired have no criminal record, to avoid hiring less desirable employees.
- The local content provision should be emphasised to minimise labour requirements needed from outside the community, as these are locally associated with safety concerns.

Cfr Environmental Monitoring Matrix (VIII.1.)

Parameter to monitor include:

- Monitoring of complaints and measuring the stakeholder satisfaction;
- Quality of water and air;
- Nuisances : noise, dust, odors, wastes, etc.;
- Soil erosion and contamination;
- Tree removal and clean-up of the ROW;
- Rehabilitation of sites (campsites, farmland, access roads).

Cfr Risk Management Matrix (Appendix 3)

Grievance Redress Mechanism

The Grievance Redress Committee, composed of representatives from the participating District, REG, Contractor and Supervising firm as well as affected communities will be created to supervise the safeguards compliance throughout the project implementation period and resolve related issues/ conflicts. This committee will ensure that all affected people are fully informed of the process for expressing dissatisfaction and for seeking redress, and will issue warnings about the consequences of failure to lodge their complaints in time. Sub-committees will also be created at the feeder road level and will be Sector and Cell based. These sub-committees will work under the coordination of the Subproject Committee.

It is encouraged to resolve the issues at Cell, Sector or District levels, as they are aware of and involved in the whole process. If the grievance is not resolved in this way, the dissatisfied party can refer the matter to the competent court. Local courts should be used. If not resolved then the high court or court of appeal of Rwanda remains an avenue for voicing and resolving these complaints.

Cfr Detail of the GRM plan: VIII. 8

Institutional arrangement for efficient implementation of ESMP – Roles and Responsibilities

The EMP implementation is the responsibility of different stakeholders. Therefore, the organizational structure is presented below.

Surveillance and monitoring must be carried out at several levels of responsibility. Contractors and more specifically environmental surveillance officers of those firms (SEO) must have a record of measures introduced. Copies of such a record must be transmitted to the Promoter, the Independent Environmentalist (EI), local authorities and ministries and agencies responsible for supervision.

Environmental parameters that will have to be monitored are, inter alia:

- Monitoring of complaints and measuring the stakeholder satisfaction;
- Quality of water and air;
- Nuisances : noise, dust, odors, wastes, etc.;
- Soil erosion and contamination;
- Tree removal and clean-up of the ROW;
- Rehabilitation of sites (campsites, farmland, access roads).

Regarding organizational responsibility, the implementation and ensuring of good functioning of the EMP are the responsibility of REG as the Promoter. REG is responsible for the project realization and must ensure that environmental aspects are taken into account during the project's implementation phase.

Moreover, REG shall appoint an Environmentalist (EI) in order for him to check the implementation of measures, their efficiency, and determine if impacts expected indeed appeared. That expert will have to report on a regular basis to the relevant ministries and environmental protection agency.

The Contracting firm will have to appoint a Site Environment Surveillance Officer (RSE). That person will have to collaborate actively with the EI in the implementation of mitigation measures at the site.

REG must also ensure that there is a Project Implementation Unit (UIP), an independent organ in charge of collaborating in the EMP operational implementation. Moreover, in addition to information and awareness raising activities, the UIP will monitor every practical aspect of the EMP.

Governmental institutions and local administration are involved in the implementation of the EMP. Ministries in charge of environment, forestry and wildlife and their agencies (REMA), as well as their decentralized units, will be tasked with ensuring regular control of activities and compliance with the standards.
(Cfr Details in VIII.8)

Estimated overall budget for the implementation of ESMP

Table 5- Estimate of cost of measures for attenuating environmental impact RWF)

Item	Line Kirehe-Kayonza	Line Nyamagabe - Gisagara	Bugesera	Line Gatsibo-Nyagatare	Line Rurindo-Gicumbi	Total (USD)
Ecological Impacts	110,000	90,000	50,000	60,000	30,000	340,000
Social Impacts	18,000	15,000	10,000	13,000	5,000	61,000
ESMP Monitoring	80,000	70,000	60,000	20,000	10,000	240,000
Sub-total	208,000	175,000	120,000	93,000	45,000	641,000
Administration costs (2 %)	4,160	3,500	2,500	192	9000	19,352
Unforeseen expenses (10 %)	20,800	17,500	12,500	960	4500	56,260
Sub-total	232,960	196,000	135,000	94,152	58,500	
Total						**716,612**

Chapter I: Introduction

The Law on Environment on environmental protection made Environmental Impact Assessment (EIA) mandatory for approval of major projects, activities and programs in the Republic of Rwanda.

This report contains the Environmental Impact Assessment for the Rwanda Transmission System Reinforcement and Last Mile Connectivity.

The overarching objective of the feasibility study is to reinforce the Rwanda transmission network and improve the rate of access to electricity supply for the people of Rwanda. The specific objective of the project is to study the technical, financial, economic and environmental feasibility of the selected transmission lines & sub stations.

The identification of the impacts of this project on the environment showed that during the project phases (pre-construction, construction, operation and decommissioning) there will be a big number of positive impacts on the human environment. This project will contribute to the creation of employment, expand electricity access while at the same time improving quality of supply at the lowest possible cost, compatibility with the scale of economic development in Rwanda, potential creation of synergies with other sectors, knowledge transfer, economic diversification and improved local socio-economy, gender balance enhancement, rational exploitation of Rwandan natural resources, possibility of savings for the employees, etc.

The project will also have negative impacts on the socio-economical and biophysical environment such as, high expectation of the local communities in relation to job posts, expectations of short-term solution to all problems of electricity connection , high expectations of getting great compensation in cases of resettlement, conflicts among workers and the local population in the project area, destruction or disruption of infrastructure and socio-economic loss, traffic congestion, noise pollution, risk of increase of HIV/AIDS and other sexually transmitted diseases, construction accident/ injuries, loss of biodiversity, soil damage and erosion, changes of landscape - Visual impact, storm water drainage and disposal, air dust/pollution, wastewater and solid waste generation, disturbance and destruction of the faunal habitat, occupational health and safety impacts, etc.

Different mitigation measures for these negative impacts have been proposed to reduce to the minimum their effects on the socio-economic environment as well as on the biophysical environment. These include: general environmental management conditions and a number of specific mitigation measures such as:

- Overall environmental management
- Dust management
- Storm water management,
- Solids and liquid wastes management,
- Land and biodiversity protection,
- Air quality management,
- Wastewater management,
- Management of Hazardous Materials and Oils,
- Health and safety management
- Expropriation to the impact of involuntary resettlement
- Etc.

In order to put these mitigation measures into practice, an environmental management plan has been developed to guide all activities of the project concerning the protection of the environment.

Recommendations are also given so that the execution of the project becomes a success without harming or with the least negative effect to the environment.

I.1 Context and objectives of the Environmental and Social Impact Assessment

Rwanda takes environmental protection very seriously and has taken significant steps to ensure the balance between economic development and environmental protection, as well as to prevent environmental degradation. Notable among the measure taken is for example the ban for manufacturing and use of polythen bags. The Government has established a clear legal and institutional framework for environmental protection. Rwanda Environmental Management Authority (REMA) is the principal agency responsible for the management of the environmental in Rwanda and coordinates, monitors and supervises all activities in this field.

In addition, as per the law, projects that affect the environment are subject to Environmental & Social Impact Assessment (ESIA) prior to obtaining authorization for their implementation.

Environmental Impact Assessment (ESIA) is defined as a systematic process of identifying environmental, social and economic impacts of a project before a decision of its acceptance is made.

The law defines types of projects that have to undergo EIA before they are allowed to go ahead with implementation. General objectives of the environmental impact assessment are:

- To identify potential environmental impacts of the lines, both positive and negative;
- To draft an Environmental and Social Management Plan (ESMP) including impact mitigation measures and an environmental monitoring program; and
- To estimate costs of mitigation measures.

The immediate objectives of ESIA are to:

- Improve the environmental design of the project
- Ensure that resources are used appropriately and efficiently
- Identify appropriate measures for mitigating the potential negative impacts of the project
- Facilitate informed decision making, including setting environmental terms and conditions for implementing the project

Long-term objectives of ESIA are to:

- Protect human health and safety
- Avoid irreversible changes and serious damage to the environment
- Safeguard valued resources, natural areas and ecosystem components
- Enhance the social aspects of the project

The following are specific objectives of the study:

- To detect the effects of the project on the neighboring environment such as the water bodies, the soil, neighboring communities, the infrastructure, the fauna, the flora and possible atmospheric impacts.
- To propose alternative measures where it is noticed that adverse effect may occur;
- To propose mitigation measures where adverse effects may have occurred;
- To carry out a diagnosis of the existing environment and activities in the area of the project;
- To highlight the potential of the construction of 110kV lines and substations with regard to environmental issues;
- To propose enforcement measures where beneficial effects from the project are detected;
- To set up an environmental management plan that will govern all activities of the project for the better protection of the environment.

Through the Environmental Study of this project, the focus was to identify the main environmental and social stakes raised by the power lines & Sub-stations, construct and define the best ways of optimizing the projects from the environmental point of view by avoiding, minimizing or offsetting negative environmental impacts. As a first step, an Environmental and Social diagnosis was established after analysis of the current state of the various environmental aspects in close collaboration concerned stakeholders including local population affected and local institutions and NGOs. Secondly plans for the implementation and monitoring of measures limiting these negative impacts of projects on the environment were prepared. Thirdly detailed estimate costs of these measures for- during and after execution of the projects were established.

This ESIA Report was prepared in compliance with the guidelines of the Governments Rwanda, as well as policies and procedures of the African Development Bank and the World Bank (see Chapter 4 on Legal and Institutional Framework).

I.2 Benefits of access to electric power

Power being today a major drive of development, the increase of the rate of access to electric power will certainly contribute to the achievement of the Strategic Development Plans of the Countries as well as the Sustainable Development Goals (SDGs) as defined by the UN, particularly the SDG 7 aiming at ensuring access to affordable, reliable, sustainable and modern energy for all.

Indeed, power appears more and more to be a basic good without which true development is not possible. Thus, access to energy, and particularly electricity, is a major lever of development thanks to its effects:

I.2.1 On poverty and hunger

Access to electric power allows for a longer working day thanks to access to light and time and money saved (easier access to energy and water). Moreover, the use of electric equipments for irrigation makes it possible to increase handicraft and agricultural productivity.

The availability of energy is also an economic development factor because it allows the development of small and medium enterprises as well as automation of processing activities for agricultural products and their conservation (refrigeration).

I.2.2 On health

The availability of electricity in health centers allows the storage of medicines (refrigeration) and increased safety at night during delivery. In addition, access to communication means (TV, radio, Internet) facilitates transfer of knowledge on basic topics such as protection against HIV-AIDS and malaria as well as telemedicine. Access to electric light also decreases internal pollution due to cooking with wood and charcoal, candles, and kerosene lamps, which reduces risks of respiratory problems. At last, access to electricity by improving living and working conditions of nurses and doctors will incite them to remain in villages.

I.2.3 On education

Time saving thanks to energy and access to electric lighting makes it easier for pupils to study at night in good conditions. Availability of electricity allows for access to the Internet and tele-education, which thus increase access to knowledge. The availability of electricity also prompts teachers to remain in rural areas and not migrate to towns. Furthermore, access to electricity and water helps improve teaching conditions and the organization of night classes for adults.

I.2.4 On the improvement of living conditions, particularly for women

Within the household, women often perform most of domestic tasks. Time saved thanks to access to electricity and the elongation of the duration of a working day thanks to electric light help women organize in a more flexible way their day and above all practice an income generating activity. Thus, they have enough personal income that ensures that they are more and more autonomous and have a better quality of life. In addition, access to media (TV, radio, Internet) helps to make progress in the image of women in the traditional societies.

I.2.5 On decrease of rural exodus

The improvement of living conditions of rural households and local job creation thanks to economic development help reduce the need for rural exodus.

I.2.6 On environment

Access to electricity reduces the need for batteries, but also biomass that is often overexploited. The use of hydropower energy also helps avoid production of greenhouse gases such as CO2 coming from the combustion of wood and charcoal for heating and cooking.

Chapter II: Policy, Legal and Institutional Framework

Rwanda has a very comprehensive legal and institution framework in relation to environmental protection, starting from the National Constitution, as well as specific laws on matters pertaining to environment or Natural Resource Protection.

II.1 Legal framework

II.1.1 Constitution of the Republic of Rwanda

The Constitution was adopted by Rwandans during the Referendum of 26 May 2003 and revised in 2015 provides that clean and healthy environment is a right to everyone (Art 22). However, the Article 53 of the same Constitution stipulates that everyone has the duty to protect, safeguard and promote the environment; the State ensures the protection of the environment; and a specific law determines modalities for protecting, conserving and promoting the environment.

Regarding the right to property, the Constitution of Rwanda is very clear:

Article 34 on right to private property, stipulates that everyone has the right to private property, whether individually or collectively owned; private property, whether owned individually or collectively, is inviolable. The right to property shall not be encroached upon except in public interest and in accordance with the provisions of the law. Whereas Article 34 is related to Right to private ownership of land and says: “Private ownership of land and other rights related to land are granted by the State. A law determines modalities of concession, transfer and use of land”. And the Article 44 on the Respect for State property says that everyone has a duty to respect State property. State property is composed of public and private property of the State, as well as the public and private property of decentralized Government entities and public institutions with legal personality; Public State property is inalienable unless there has been prior transfer thereof to the private State property in accordance with the law; Any act intended to damage, destroy, embezzle and squander State property is punished by law.

Finally, the National Constitution of Rwanda prohibits to make international agreements permitting the transit or dumping, on national territory, of toxic waste and other hazardous materials likely to cause serious damage to public health and the environment (Art. 169).

The present ESIA study is in line with the provisions of the Rwanda Constitution and the ESMP contains specifically detailed measures to take care of these provisions during all the project’s implementation phases.

II.1.2 Strategies and policies

a) The National Strategy for Transformation (NST1)

The development landscape in Rwanda has changed considerably since the adoption of the Vision 2020 in the year 2000. The progress made in less than two decades has given Rwandans much hope and belief to aspire for greater achievements. Before the Vision 2020 has come to term, Rwanda embarked in 2017 on the reflection and elaboration of a Vision 2050, which aspires to take Rwanda to high living standards by the middle of the 21st century and

high quality livelihoods. The implementation instrument for the remainder of Vision 2020 and for the first four years of Vision 2050 will be the National Strategy for Transformation (NST1). NST1 will provide the foundation and vehicle towards Vision 2050.

The National Strategy for Transformation (NST1), which is also the Seven Year Government Programme (7YGP), comes at a unique moment in the country's development trajectory which will see the crossover from Vision 2020 towards Vision 2050. This strategy is expected to lay the foundations for decades of sustained growth and transformation that will accelerate the move towards achieving high standards of living for all Rwandans.

The NST 1 will pick up from where the Economic Development and Poverty Reduction Strategy (EDPRS 2) left off, and continue in an effort to accelerate the transformation and economic growth with the private sector at the helm. With this new strategy, Rwanda's public policy will focus on developing and transforming Rwandans into a capable and skilled people ready to compete in a global environment.

Under Priority Area 4: Promote industrialization and attain a structural shift in the export base to High-value goods and services with the aim of growing exports by 17% annually. Key strategic interventions include:

Reduce the cost of doing business and facilitate trade by implementing key projects, including:

- Scale up electricity generation and improve quality, affordability and reliability [Action 23]. Generation plans will be informed by medium and long-term projections and analysis of supply and demand. Long-term generation plans will include identification of least cost sources of energy generation with the objective of ensuring a cost-reflective and competitive tariff. A pro-active strategy will be developed to attract industries for economic growth and to ensure that they are supplied with available, reliable and affordable electricity. Key sectors of focus to increase demand include mining, manufacturing, ICT and commercial premises. Quality of electricity will be improved by continuing investments in network upgrading and strengthening as well as investing in loss reduction projects. Priority will be given to productive use connections such as industrial zones, market centers and other socio-economic facilities such schools and health centers.

Priority Area 5: Moving Towards a Modern Rwandan household

This will be achieved through Universal access to basic infrastructure such as electricity, water, Sanitation and broadband. Key strategic interventions:

- Access to electricity will be scaled up to all from 34.5% (Estimates 2017) to 100% by 2024 in collaboration with the private sector to reach off-grid areas and investments in grid expansion [Action 8=69]. Access to electricity by households is a key indicator of the NST1: it is projected that 71.5% of Households will have access to electricity by 2020/2021 and reaching the 100% target by 2023/24 from a baseline of 27.1 in 2016/2017.

The project is exactly the response toward the implementation of the NST1 and the achievement of the set targets.

b) The National Environment and Climate Change Policy (MoE, 2019)

Vision 2050 aspires to take Rwanda beyond high income to high living standards by the middle of the 21st century. To realize our full potential and drive towards this goal, Rwanda is committed to being a nation that has a clean and healthy environment that is resilient to climate variability and change and that supports a high quality of life for its citizens. This Environment and Climate Change Policy reaffirms the government's commitment to address climate change and its resolve to lessen the potential hardships that climate change may pose to the sustainable development of the country. The policy, therefore, seeks to provide strategic direction on environment and climate change in Rwanda, bearing in mind its linkages with the country's socio-economic development.

The National Environment and Climate Change Policy provides strategic direction and responses to the emerging issues and critical challenges in environmental management and climate change adaptation and mitigation. The key issues and challenges identified include high population density, water, air and soil pollution, land degradation, fossil-fuel dependency, high-carbon transport systems, irrational exploitation of natural ecosystems, lack of low-carbon materials for housing and green infrastructure development, inadequate waste treatment for both solid and liquid waste, increase of electronic, hazardous chemicals and materials waste, among others.

The policy is designed within the context of national, regional and global development commitments (e.g. Vision 2050 aspirations, National Strategy for Transformation (NST1), Green Growth and Climate Resilience Strategy (GGCRS), Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs), Agenda 2063, East African Community - EAC Vision 2050, etc.). It also provides a policy framework to tap into opportunities of a green growth led and climate resilient economy. This Policy was developed through a consultative process involving all stakeholders. Consultations with actors at national and district levels, development partners, the private sector and CSOs informed the development of policy objectives and proposed policy actions.

The policy goal is for "Rwanda to have a clean and healthy environment resilient to climate variability and change that supports a high quality of life for its society." The seven objectives of the policy are (1) Greening economic transformation; (2) Enhancing functional natural ecosystems and managing biosafety; (3) Strengthening meteorological and early warning services (4) Promoting climate change adaptation, mitigation and response; (5) Improving environmental well-being for Rwandans; (6) Strengthening environment and climate change governance; and (7) Promoting green foreign and domestic direct investment and other capital inflows. To implement these policies, 22 policy statements and 127 policy actions have been identified.

It is evident that energy component, particularly production and promotion of clean energy and make it accessible to the citizens is central to the this policy, especially implicitly implied in strategic objective (1) Greening economic transformation; and (4) Promoting climate change adaptation, mitigation and response;

Key relevant action points are:

1. Promote resource efficiency technologies to reduce energy consumption in processing industries;

2. Promote renewable energy to achieve universal access to electricity.

The ESIA is a key instrument to ensure environment sustainability and hence an element toward realization of the policy's goals and objectives.

c) The Green Growth and Climate Resilience Strategy / National Strategy for Climate Change and Low Carbon Development (2011)

This strategy is one of the initial steps on a pathway which leads to a sustainable, secure future where Rwanda is prepared for the risks associated with climate change, population growth and rising oil prices. The 'National Strategy for Climate Change and Low Carbon Development' aims to build upon work that is already being done in Rwanda on climate change, focusing the various projects and policies into a holistic national document which encompasses long-term direction and short-term actions.
The focus thus far has been on adaptation as Rwanda is highly vulnerable to climate change due to its dependence on rain-fed agriculture. However the focus is shifting to climate resilience and low carbon development which addresses both adaptation and mitigation, whilst focusing on sustainable economic growth and poverty reduction. Rwanda has the opportunity to leapfrog old technologies and destructive development pathways, and build a green economy, resilient to oil prices spikes and a changing climate.
This Strategy however, looks beyond 2020 to 2050, and recommends actions that Rwanda can take in the short to medium term to ensure its future stability and prosperity in a changing climate and uncertain energy future

The purpose of the Strategy is threefold:

- To guide national policy and planning in an integrated way;
- To mainstream climate change into all sectors of the economy; and
- To position Rwanda to access international funding to achieve climate resilience and low carbon development.

With regard to Energy development, this is key strategic objective for this strategy:
To achieve Energy Security and a Low Carbon Energy Supply that supports the development of Green Industry and Services and avoids deforestation

Rwanda will exploit its clean energy resources to support a low carbon national grid which will enable industry to operate in a low carbon way. The grid will be expanded, enabling development and reducing the demand for wood fuel and charcoal, thus avoiding deforestation. This move to a low carbon economy will reduce vulnerability to oil price spikes and improve energy security. More specifically, this Strategy has 2 specific Action Programs pertaining to Energy and energy diversification:

1) Programme 5: Low Carbon Energy Mix Powering the National Grid

Currently the country's generating capacity is about 224.6 MW, with a maximum demand as high as 150MW, which will continue to escalate as the economy recovers[1]. The deficit is heavily experienced during peak periods, thus periods of high electrical energy demand. This deficit has sometime resulted in erratic and sustained load shedding during peak hours.

[1] Rwanda Energy Group data ,2020

In order to distribute the power generated by different sources of energy, electrical transmission lines ranging from high voltage to low voltage have to be in place.
Rwanda electricity transmission network have to be constructed since 1950's and continue to expand. Currently regional interconnections are under development to allow power trade in the region
The national energy balance statistics in Rwanda is by far leaded by biomass (83%), followed by petroleum products (9.7%) and electricity (1.3%) while others are less than 0.5%.
The energy matrix of Rwanda sums up to 224.6 MW of installed capacity which 2% comes from importations. The renewable energies with Hydro (47%) and solar (5%) count for more than half of the installed capacity while Diesel (27%) and Peat, Methane gas respectively count for 7% and 12%.

2) **Programme 6: Sustainable Small-scale Energy Installations in Rural Areas**

The majority of Rwanda's population does not have access to the electricity grid and is dependent on wood for fuel. There is much potential for off-grid or mini-grid generation from biogas, solar PV and micro-hydropower. This should be utilised to increase access to electricity in rural areas reducing the dependence on wood fuel and supporting economic development. This strategy should be seen as complementary to the grid expansion plans. To increase development of small scale generation in rural areas, Rwanda will:

- Encourage private sector involvement through performance-based grants and incentives for consumer finance;
- Maximize energy project potential through high load factors and appropriate maintenance; and
- Build consumer confidence through demonstration and product standards.

An evaluation of this Green Growth and Climate Change Strategy was assessed and evaluated in 2018 by the GGGI in consultation with concerned stakeholders

Results of the evaluation reveal that:

Program 5: Law Carbon Energy Mix Powering the National Grid:
Slow progress is reported in the implementation of the action to reduce oil fuel electricity generation which has been reduced from 28.0% (52MW oil: 185MW total) to 26.5% (57.8MW oil: 218MW total) in 2017 whereas no strategy has been put in place to phase out electricity generation from peat. However private investment incentives were put in place and have resulted in a slight increase in IPP generated electricity from 38.7% (73IPPs:190MW total) in 2016 to 52% (109.6MW of 210.9 total) in 2017.
Key observations: The low carbon energy mix for powering the grid remains relevant and critical to national strategic objective for achieving low carbon and climate change resilience. Cearly there are challenges affecting the effectiveness and efficiency of the actiions in view of slow and low levels of achievement. On the other hand, it is evident that the government is making all efforts to increase energy generation for the national gird from renewable sources, especially hydropower. It is not possible to quantify efficiency of execution as data on resturns of investments are not available.

Program 6: Sustainable small scale energy installation in rural areas
The evaluation shows none of the 3 actions achieved significant changes from the progress

figures of 2015. Although there were 8 new off grid solar investors into the market, no new investors were forthcoming neither in hydro nor in on-grid solar power. Moreover it would appear that 38 companies left the biogas business while 41 left the charcoal market. It is not clear whether the failures were a result if consumer change to liquid natural gas (LNG) due to incentives put in place for the latter including for the latter including VAT exemption. It is not clear what specific activities for the action to increase private sector involvement in renewable energy generation or activities undertaken to ensure high load factors of and to build consumer confidence in renewable energy installations.

Key observations: Sustainable small scale energy installations in rural areas are highly relevant to national development priorities. However, it is evident that the effectiveness, efficiency, desired impact and sustainability are in question. It is recommended that relevant institutions be engaged in dialogue to identify the barriers to the execution of the actions.

This project contributes to the realization of the clean energy related objectives and targets of this specific policy.

d)The National Biodiversity Policy (2011)

The National Biodiversity Policy recognizes that that Rwanda's viability is dependent on the conservation of its biological resources as these resources contribute significantly to livelihoods, food sovereignty, health, the environment, cultural diversity and the economy. Yet despite the high richness of the Rwanda's biological diversity, the later continues to reduce worryingly due to population pressure and development needs. This Policy's goal is therefore:

To conserve Rwanda's biological diversity, to sustain the integrity, health and productivity of its ecosystems and ecological processes, whilst providing lasting development benefits to the nation through the ecologically sustainable, socially equitable, and economically efficient use of biological resources. The Purpose of this policy is to: provide an overarching framework for the conservation, sustainable utilization, access to biodiversity resources and fair and equitable sharing of benefits derived from the resources.

This policy is based on fundamental principles, such as:

- Intrinsic Value. All life forms and ecological systems have intrinsic value.
- Duty of Care. All people and organizations should act with due care to conserve and avoid negative impacts on biodiversity, and to use biological resources sustainably, equitably and efficiently.
- Sustainable Use. The benefits derived from the use of Rwanda's biological resources are dependent upon:
    - Maintaining the ecological integrity of the natural systems;
    - Minimizing or avoiding the risk of irreversible change induced by humans;
    - Adequate investments to ensure conservation and sustainable use of biodiversity; and
    - Avoiding or minimizing adverse impacts of the use of non-renewable resources on biodiversity.
- The Fair and Equitable Distribution of Benefits.
- Full Cost-Benefit Accounting. Decision-makers and users of biological resources will be guided by economic approaches which assess the full social and environmental costs and

benefits of projects, plans and policies that impact upon biodiversity, and which internalize costs borne to the environment and to society.

- Informed and Transparent Decision-Making.
- The Precautionary Principle. Where there is a threat of significant reduction or loss of biological diversity but inadequate or inconclusive scientific evidence to prove this, action should be considered to avoid or minimize threats.
- Accountability and Transparency. Those making and implementing decisions relating to the conservation and use of biodiversity in Rwanda will be accountable to the public for their actions through explicit, justifiable processes.
- Subsidiarity. Governance responsibilities belong at the level at which they can be most effectively carried out.
- Participation. Interested and affected individuals and groups will have an opportunity to participate in decisions about the ways in which biological resources are conserved and used.
- Recognition and Protection of Traditional Knowledge, Practices and Cultures. Coordination and Cooperation. An enabling framework will be provided for the future coordination and cooperation of biodiversity-related activities in Rwanda, in the east African sub-region, and globally.
- Integration. The conservation and sustainable use of biodiversity will be integrated strategically at all levels into national, district, local and sectoral planning, programmes, and policy efforts.
- Global and International Responsibilities. Rwanda has a shared responsibility for ensuring the conservation and sustainable use of biodiversity

Regarding the relevance of this policy to the project is the fact that this policy provides for the establishment of a System of Protected Areas whose protection and management is guaranteed by law. In this regard, no activity can be undertaken within the limit of these Protected Areas without the specific authorization of the concerned authorities. The ESIA will endeavor to identify which elements of the biodiversity could be affected by the project, and establish the relevant mitigation measure.

e) The National Forest Policy (2015)

The National Forest Policy is concerned with issues related to forests, but also to ecological and economic safety of trees, bush research, forestry under any form and capacity building. The purpose of that policy consists in making forestry one of the pillars of the national economy and ecological viability.

The vision for the forest sector in Rwanda is that in 2024, the population's wood and other forest resource needs be met in terms of energy production for domestic purposes. The sector will significantly contribute to the household income, improvement of human and animal feeding, significant reduction of soil erosion and improvement of farmland fertility. To materialize that vision, forest coverage is expected to reach at least 30 % of the national territory and agroforestry will be practiced on at least 85 % of family farm holdings.

The National Forest Policy is focused, among others, on the following elements:

- To increase and diversify forest resources;

- To organize tree belts around natural forests;
- To classify mountains tops and slopes with steep terrain as forest land and to protect them;
- To prohibit wood use in brick making factories, tile kilns, charcoal factories, and scaffolds
- To rehabilitate degraded forests and woodlands;
- To manage and protect natural forests;
- To introduce and strengthen the functioning of District Forest Funds and their capacity in terms of forest management.

The ESIA will endeavor to assess if forests and individual trees could be affected during project implementation, through clearing for right of way. Adequate compensation will be implemented accordingly.

f) The National Wetlands Management Policy (2015)

Swamps are included in State land. They are a part of wetlands and include among others:

- Marshes and wetlands;
- Permanent lakes, rivers, water, watercourses, and brooks;
- Intermittent and regular lakes, rivers, watercourses and seasonal, brooks, including flooding plains;
- Pools, swamps and peat bog;
- Irrigated lands, including irrigation channels and rice fields;
- Seasonal flooded agricultural land;
- Water storage areas including reservoirs and dams. Their use is notably submitted to the following conditions:
- To have prior authorization from the Minister in charge of environment or his/her delegate before undertaking marshes and other wetland use and development project;
- To have prior authorization to introduce, import or export any animal or plant species in wetlands;
- Prohibition to plant or introduce wetlands species that are likely to undermine the environment, especially those derived from modified living organisms;
- Prohibition to practice fishing and hunting activities in wetlands without a written authorization;
- Prohibition to plant eucalyptus and banana trees in wetlands except for environment protection purposes;
- Prohibition to construct residences in wetlands;
- Prohibition to set up market places, industries or factories, dumpsites, slaughterhouses, fuel or washing stations, garages, cemeteries or any other building likely to degrade those areas;
- Prohibition to drop any sort of wastes and discharge wastes that are potentially harmful for environment and health in wetlands.

Sanctions are also provided for the ones who:

- Clears or drains a wetland without a written authorization;

- Erects, constructs, places, alters, displaces or destroys any structure that is in, under or on a wetland;
- Disturbs a wetland by practicing boring or by excavating a tunnel in a way that is likely to have negative effects on a wetland;
- Destroys, damages or disturbs any wetland in a way that is likely to have negative effects on plants, animals or their habitats;
- Introduces any exotic plant or animal species that is likely to harm wetlands;
- Draws the soil from the wetland or practices bushfire in the wetland;
- Omits, neglects or refuses to protect shores against environmental degradation;
- Pursues an activity subject to suspension or prohibition.

Those who do not comply with the above-mentioned rules may be subject to the obligation of carrying out works intended to rehabilitate the degraded wetlands. The ESIA will identify the areas and extent of impacts on wetlands to be addressed through the ESMP.

g) The National Decentralization Policy (2000)

The overall objective of the Decentralization Policy is to ensure the local population's political, economic, social, administrative and technical empowerment to fight poverty by participating in planning and management of their development process.

The District is a legal entity with the power to sue and to be sued, and is therefore considered as a local government. The Province, the Sector, and the Cell are administrative divisions with the mission of efficient implementation of government activities, both at the central and local levels, as well as local community development and service provision.

The creation of Provinces and Districts must respect certain criteria, among which, the population numbers, economic viability, accessibility to public services, and environmental considerations.

The decentralized organs as provided for in this policy will be key stakeholders for the implementation of this project, and are part of the extensive consultation process for the elaboration of the present ESIA Report.

h) The National Gender Policy, 2004

The National Gender Policy is in line with the sustainable development agenda adopted by the Government, and is focused around the three following policies and strategies: Vision 2020, the National Poverty Reduction Strategy and the Decentralization Policy. The general purpose of the National Gender Policy consists in clearly defining the mainstreaming process for gender related issues into all development sectors, to promote gender equality and equity in Rwanda. A special attention will be paid to gender inequalities in rural areas. Thus, specific issues facing rural women are raised and will be effectively taken into consideration.

The National Gender Policy targets different priority areas, among which environment. In this area, the objective defined in the National Gender Policy is to ensure that the gender dimension is systematically and effectively considered in environment protection and natural resource management policies, programs and activities. Environment protection strategies aim at:

- Undertaking actions designed to mainstream gender in environment protection and natural resource management laws;
- Undertaking measures designed to ensure women and men's effective participation to environment protection and natural resource management.

In the framework of implementing this policy, the role of every actor is defined in the light of the decentralization policy, where the implementation role is passed on from the central government to local governments. As part of the implementation of this project, through ESMP, the contractor will make sure to promote recruitment procedures and a working environment that consider gender differences and inequalities. It will introduce a system designed to develop women entrepreneurship.

i) The Rwanda Energy policy (2011)

The purpose of the Energy Policy is to respond to the Rwandan population's energy challenges and needs for economic and social development within a viable and sustainable environmental framework. More specifically, the Energy Policy aims at:

- Making available affordable and sufficient energy supply throughout all the country;
- Reforming the energy service market and establishing an adequate institutional framework that will facilitate investments, service expansion, efficient pricing mechanisms and incentive measures from a financial point of view;
- Strengthening the development and use of renewable and local energy sources and technologies;
- Appropriately taking into account environmental considerations in all energy activities;
- Increasing energy efficiency and conservation in all sectors;
- Increasing education in the energy area and building gender balance in planning, implementation and monitoring of the energy sector.

The project aims at the realization of this policy's objectives.

j) The Rwanda Energy Sector Review and Action Plan (2013)

Achieving the Vision 2020 objectives will necessitate transforming the country from a low-income agrarian economy to a medium income export oriented economy, operating as a knowledge-based service hub. Three key constraints will need to be overcome. First, the nascent but growing private sector is yet to play its role as a growth driver, in spite of the sustained improvements in the business regulatory environment. Second, inadequate physical infrastructure remains a key binding constraint to economic growth, human development and growth in exports. Third, institutional and technical capacity has emerged as bottleneck to achieving the desired rapid economic growth.

The energy sector is also faced with a cross-section of all these bottlenecks. An energy sector policy and strategy was prepared in 2009 and articulates the mandate of the energy sector to effectively contribute to the country's development agenda. However, achieving the sector's goals and objectives will require prioritizing the following policy imperatives:

(i) development of domestic energy sources;
(ii) efficient use of energy;

(iii) rationalizing energy pricing and subsidies;
(iv) institutional development of the sector; and
(v) Capacity building.

This study aims to complement Government's efforts in ensuring the availability of reliable and affordable energy production that is also environmentally sustainable. This study serves a number of purposes. First, it identifies the core energy infrastructure bottlenecks facing the country and options for mitigating these challenges. Second, it presents a road map and action plan covering both the expansion of physical infrastructure and the development of sector structure, regulation, and institutional capacity; distinguishing be

tween the short-and longer-term measures. Third, it identifies innovative approaches to crowd-in private sector investment and financing including the use of partial credit guarantees and establishment of an energy efficiency development fund. The roadmap and action plan are expected to guide the preparation of the second Economic Development and Poverty Reduction Strategy and for informing dialogue on key reform measures.

The project aims at the realization of this plan's objectives.

k) The Energy Sector Strategic Plan (2018/19 – 2023/24)

Energy is central to Rwanda's economy and development plans. It supports all other sectors, including housing and urbanization, manufacturing, agro-processing, mining, tourism and IT services. As such, a well-functioning, efficient energy sector is a prerequisite of achieving the country's national goals. The Energy Sector Strategic Plan (ESSP) is vital in delivering this.

The ESSP will ensure effective delivery of the targets for the energy sector as set out under the National Strategy for Transformation (NST-1) and guide the implementation of the National Energy Policy (REP). The ESSP thus functions as a plan that serves to translate policy directives and principles into concrete measures necessary to reach medium-term targets, reflecting current resource constraints and risk and uncertainties.

This ESSP follows on from the earlier 2013/14 – 2017/18 ESSP. This new ESSP reviews the current status of the sector and outlines high-level target objectives (HLTOs). These have been determined on the basis of political ambitions and rigorous technical analysis. The HLTOs apply to all subsectors and serve to translate the policy goals laid out in the REP and NST-1 into tangible outcome indicators achievable by the end of the NST-1 period (2018/19 to 2023/24). These are:

- Generation capacity increased to ensure that all demand is met and a 15% reserve margin is maintained.
- Reliability of electricity supply improved: average number of power interruptions per year reduced to 14.2 and average number of hours without power to 91.7. Household access to electricity increased to 100%.
- Productive user access to electricity increased to 100%.
- Existing, New major national and urban roads provided with street lighting.
- Losses in the transmission, distribution networks and commercial reduced to 15%.

- Halve the number of HH using traditional cooking technologies to achieve a sustainable balance between supply and demand of biomass through promotion of most energy efficient technologies
- Petroleum strategic reserves increased to cover three months' supply.

This Strategy takes stock of the previously existing policies, strategies and laws in relation to Energy sector in Rwanda. The project aims at the realization of this Strategy's objectives.

l) The Rwanda Rural Electrification Strategy (2016)

The Government of Rwanda recognizes the vital role that electricity access plays in accelerating economic development through improving health and standards of living. Energy and particularly access to electricity is the Government's key priority. This is why significant investments have been made and progress registered led to over 24% of households getting access to electricity. More efforts need to be made for the Government to achieve the set targets of 70% by 2017/18 and 100% by 2020.

For the above targets to be met, a combination of solutions that focus on the location, income and consumption level is required instead of the traditional connection to the grid that may not be suitable for all households. The most cost effective means for increasing access to electricity is through the use of off grid solutions that have wide range of technologies such as a basic solar lantern that can charge a phone or radio to a solar home system

The Government developed this strategy with the objective of ensuring that Rwanda's households have access to electricity through the most cost effective means by developing programmes that will facilitate both the end users to access less costly technologies and increase private sector participation in the provision of these solutions. The four distinct programmes in the strategy include; the provision of basic solar systems as a basic necessity to the less privileged population under Ubudehe 1, the establishment of a risk mitigation facility that will support the private sector, mechanisms that will increase, the development of mini-grids in suitable locations and the continued rollout of the Electricity Access Rollout Programme (EARP). The Government will work with the private sector in implementing this Strategy. Particular focus will be on increasing competition within private sector which will lead to reduced costs and improved choice of technologies on the market. The Government focusses on supporting private companies to have access to different mechanisms and

The Rural Electrification Strategy can be considered as four distinct programmes:

- Government will establish a mechanism to allow low-income households to access modern energy services through a basic solar system as a basic necessity.
- Government will establish a risk-mitigation facility targeting the private sector such that solar products will be made available on financial terms that the population can afford.
- Mini-grids will be developed by the private sector with Government playing a key role in identifying sites and establishing a framework through which these can become financially viable investments.
- Government will continue to roll out the electricity network via EARP, focusing on connecting high consumption users and driving economic growth.

The project aims at the realization of this Strategy's objectives.

II.2 Legislation

II.2.1 Law on Environment (N°48/2018 of 13/08/2018)

The Law on Environment defines Environment as: a diversity of things made up of natural and built environment, including chemical substances, biodiversity as well as socio-economic activities, cultural, aesthetic and scientific.

The law defines also key principles on which the environmental protection is based on, and including: Precautionary principle (Art 3); Principle of environmental sustainability (Art 4); Polluter pays principle (Art 5); Principle of information dissemination and incentives for environmental conservation (Art 6); Article 7: Principle of cooperation (Art 7).

The Law provides for the use, management and protection of key environmental resources such as: soil and subsoil resources (Art 10); water resources (Art 11 & 12).

Under the Chapter IV on the conservation and protection of built environment, the law provides for the management of different types of wastes, including: liquid waste (Art 17); solid waste (Art 18); hazardous and toxic waste (Art 19); and electronic waste (Art 20).

Chapter V of this law provides for obligations of the state, decentralised entities and local communities with regard to the protection, conservation and promotion of environment.

Regarding the procedures related to environmental management, Art 30 specifies that a Ministerial Order establishes the list of projects that must undergo Environmental Impact Assessment (EIA) and defines also its process and procedures and delivery of authorization before project implementation. Similarly for the list of policies and programs that must undergo Strategic Environmental Assessment (SEA) (Art 31). Art. 32 stipulate that every project that may have significant impact on the environment must undergo an environmental audit (EA) during and after its implementation. The list of projects that must undergo environmental audit is established by an Order of the Minister. An Order of the Minister also issues instructions and procedures for conducting environmental audit.

On the approval of the EIA, SEA, EA, the Art 33 states that these assessments must be approved by the Authority or another State organ authorised in writing to do so by the Authority. If the approval is made by an authorised organ, such an organ does so on behalf of the Authority which is also responsible for its audit.

The law establishes also the list of prohibited acted:

- In wetlands and Protected Areas (Art 42);
- Related to emissions of harmful noise (Art 43);
- In protection of biodiversity (Art 44);
- In relation to chemicals and waste (Art 45)

Similarly, the law also spells out administrative sanctions in relation to:

- Implementing a project without environmental impact assessment clearance (Art 46);
- Violation of required distances (Art 49)
- Polluting public and private area (Art 50);
- Polluting public or private area by human wastes (Art 51);
- Burning waste (Art 52);
- Causing noise pollution (Art 53)
- Importing, immersing, burying, burning of waste or using any other means that cause their decomposition (Art 57);
- Hunting, selling, injuring or killing a protected animal species (Art 58);

Finally, Chapter VII establishes measures for inspection and criminal investigation power in environmental matters. Art 61 defines staff with inspection capacity:

- Staff of the Authority;
- Staff of the City of Kigali and those of the district.

The Authority puts in place instructions governing inspection process.

Article 62 establishes the powers of the inspectors as following:

- to inspect installations, factories, stores, shops and retail outlets, construction, houses, machines, vehicles, devices and products;
- to inspect records relating to the operations of the factory; 3° to take a sample of elements suspected of degrading environment, measure, take and conduct a required research;
- to provisionally suspend or ban activities or materials considered to degrade the environment;
- to impose an administrative fine provided for under this Law

Article 63 stipulates that an Order of the Minister in charge of Justice grants some of staff members of the Authority the power of criminal investigation in environmental matters.

The ESIA process responds to obligations under this law and will ensure that the key principles, as well as the relevant provisions of this law are fully complied with.

II.2.2 Law governing land in Rwanda (N° 43/2013 OF 16/06/2013)

The Art 1 of this law defines its purpose:

This Law determines modalities of allocating, acquisition, transfer, use and management of land in Rwanda. It also establishes the principles applicable to rights recognised over all lands situated on Rwanda's national territory and all rights united or incorporated with land, whether naturally or artificially.

Art 3 of this law specifies that land as common heritage:

The land is part of the common heritage of all the Rwandan people: the ancestors, present and future generations. Notwithstanding the recognised rights of people, only the State has the supreme power of management of all land situated on the national territory, which it exercises in

the general interest of all with a view to ensuring rational economic and social development as defined by law. Therefore, the State is the sole authority to accord rights of occupation and use of land. It also has the right to order expropriation in the public interest.

Under this law, the expropriation is defined as: an act of taking away individuals' land by the State due to public interest in circumstances and procedures provided by law and subject to fair and prior compensation;

Art. 14 defines the State land in the private domain which consist of all the land that is not included in State land reserved for public activities or infrastructures and land that does not belong to public institutions or local authorities or individuals. That land shall be comprised of the following:

- vacant lands;
- escheat lands;
- confiscated lands in respect of the provisions of this Law;
- State land previously occupied by public activities removed from public domain in accordance with the laws;
- land acquired by the State through purchase, donation or expropriation for public interests;
- unprotected swamps;
- land occupied by State owned forests;
- land resulting from non-renewed lease issued to foreigner as provided by this Law;
- Land reserved for specific cemeteries.

Similarly, land in public domain of public institutions (Art 16) consists of land reserved for public para-statal institutions activities and infrastructures. Land in private domain of public institutions shall consist of the following categories:

- land not reserved for public activities use by public institutions;
- public institutions land previously used for public activities but which was removed from public domain in accordance with the law;
- land acquired by public institutions through purchase, donation or expropriation for public interests;
- Land occupied by public institutions forests.

The transfer of land from the public domain of public institutions to their private domain shall be done by an Order of the Minister in charge of land on proposal by the supervising Authority.

Regarding the enjoyment of full rights, Art 34 states that: the landowner shall enjoy full rights to exploit his/her land in accordance with the provisions of this Law and other laws. The State recognizes the right to freely own land and shall protect the landowner from being dispossessed of the land whether totally or partially, except in case of expropriation due to public interest.

The ESIA will provide an avenue for compliance with this law, while its provisions are to be addressed through the Compensation scheme and RAP.

II.2.3 Law determining the management and utilization of forests in Rwanda (N°47bis/2013 of 28/06/2013)

The law distinguishes state and private forests. Art 5 lists the following categories as states forests:

- protected forests;
- production forests ;
- Forests reserved for research.

In order to improve the forest management, the law provides for issuance of Licence (Art 48). However, Art 49 stipulates that the contents of each license provided for by this Law, its period of validity and conditions for its period of validity and conditions for its issuance shall be determined by an Order of the Minister. A special License for clearing the whole of part of forest so that the land it covers is used for other purposes shall be issued by the Minister (Art 52).

The ESIA will comply with this law by identifying forests requiring Minister's license for clearing for purpose of right of way for power lines.

II 2.4 Law governing biodiversity in Rwanda (N° 70/2013 of 02/09/2013)

The purpose of this Law is to determine modalities for management and conservation of biological diversity within Rwanda (Art 1).

Under this Law, Art 14 stipulates that an Order of the Minister shall set out a national list of ecosystems that are threatened and in need of protection and their location, which shall refer to:

- critically endangered ecosystems;
- endangered ecosystems;
- vulnerable ecosystems;
- Other ecosystems with high conservation value or of high national importance.

Corollaire to this article, an Order of the Minister shall also set out a list of activities prohibited in an ecosystem included on the list of ecosystems in need of protection (Art 15).

Similarly, Art 16 states equally that an Order of the Minister shall set out a list of the species in need of protection, in accordance to the following categories:

- critically endangered species ;
- endangered species;
- vulnerable species;
- Other species of such high conservation value or national importance that require protection, although they are not included in the categories of critically endangered, endangered or vulnerable species.

Art 17 precises that activities involving species or specimens included on the list of endangered or protected species are prohibited, unless authorized by the Minister.

The ESIA will determine sensitive and protected ecosystems to be affected by the project, and devise alternative or mitigation measures.

II.2.5. Ministerial Order establishing the list of Protected Animals and Plants Species in Rwanda (No. 007/2008 of 15/08/2008)

According to this Ministerial Order, the species of protected animals are classified into: Mammals, birds, and reptiles (Art 1) and are listed in Appendix I of this Ministerial Order. These animals should not be hunted except when there is prior authorization from competent authorities (Art 2). This list comprises:

Annex 1: - Mammals: 18 species
- Birds: 15 species
- Reptiles: 4 species

Art 4: The list of protected plants is found in appendix II. The plants mentioned in appendix II should not be uprooted or cut without prior authorization from competent authorities.

This list comprises:

Annex II: - Plants: 27 species

The ESIA will determine sensitive and protected species to be affected by the project, and devise alternative or mitigation measures.

II.2.6. Ministerial Order establishing the list of Projects that must undergo Environmental Impact Assessment, Instructions, Requirements and Procedures to conduct Environmental Impact Assessment in Rwanda (No 001/ 2019 of 15/04/2019)

The Ministerial Order defines environmental impact assessment as: systematic process of identifying environmental, social and economic impacts of a project, before a decision of its acceptance is made,

Art 3 and 4 specifies respectively the works, activities and projects that must undergo a full environmental impact assessment (listed on Annex I) and those that must undergo a partial environmental impact assessment (listed on Annex II). No public institution is authorized to take a decision, to warrant a certificate, approve or authorize the commencement of a project mentioned in the annexes of this Order without prior environmental impact assessment.

[Construction of hydro-dams, hydropower plants and electrical lines of high and medium voltage; are among the works / activities listed in Annex I, and must therefore undergo a full EIA].

Art 5 precises that projects, works and activities that are not listed on the Annex I and II to this Order are not subject to the environmental impact assessment. However, when it is evident that work, activity or project not listed on the Annex I and II to this Order has a negative and irreversible impact on the environment and is similar in nature to the work, activity or project

listed in Annex I and II of this Order, the Authority or authorized organ may request the developer to conduct an environmental impact assessment.

Chapter III of this Ministerial Order concerns instructions, requirements and procedures to conduct environmental impact assessment.

Under this Chapter, Article 6 refers to the application for authorization to conduct the environmental impact assessment and states that:

The developer, whose project is on the list of the projects that require environmental impact assessment listed in Annex I and II of this Order, selects an expert from the list of environmental assessment practitioners published in accordance with relevant laws to conduct the study. The selected expert must not have any direct or indirect interests in that project. The selected environmental impact assessment expert, on behalf of developer, submits an official application for environmental impact assessment of a proposed project to the authorized organ in form of a project brief together with proposed terms of reference for review and approval. The details of the required information are found in the environmental impact assessment guidelines provided by the Authority.

After reception and analysis of the project brief and proposed terms of reference, within fourteen (14) days, the authorized organ approves or requests for update of terms of reference for conducting the environmental impact assessment.

Art. 7 on the process of the Environmental impact assessment stipulate that this must be based on the terms of reference mentioned in Article 6 of this Order. The selected expert has a duty to involve the developer in all stages of the environmental impact assessment process. The expert has also a duty to appraise the developer of his or her responsibilities and obligations in implementation of the outcomes of the environmental impact assessment. The environmental impact assessment is done with due consideration of the opinion of all the relevant stakeholders.

The submission of the environmental impact assessment report is per Art 8, which states that upon completion of the environmental impact assessment, the selected environmental impact assessment expert submits to the authorized organ a copy of the report in an electronic format “word and PDF format”. Where the selected environmental impact assessment expert considers it necessary he or she may provide an addendum to the report for the facts that are not provided for under the terms of reference.

Art. 9 refers to the analysis of environmental impact assessment report and mentions that upon reception of the environmental impact assessment report, the authorized organ analyses the report to verify conformity with the terms of reference and guidelines. The authorized organ, within twenty (20) working days, after reception of the environmental impact assessment report, accept or request for additional information from selected environmental impact assessment expert.

Depending on the nature of the project, the period provided for in Paragraph 2 of this Article may be increased after informing the selected environmental impact assessment expert, in writing, before the lapse of the days mentioned in Paragraph One of this Article. If it becomes necessary to hold public hearing, the authorized organ requires an additional period of fifteen

(15) working days from the date of public hearing notification. The stakeholders may comment on the environmental impact assessment report and express views on the impacts of the proposed project. The authorized organ covers all costs of the public hearing process. In the framework of public hearing, the authorized organ must notify the public of the following:

1) The day, time and venue where the public hearing will take place by using at least any of the three (3) of the following means:
    a. to publish a notice twice in any local newspapers;
    b. running four (4) radio announcements;
    c. to put up posters at the site of the proposed project;
2) The developer's details including name and address.

The decision making and authorization is subject of the Art 11 which stipulates that the authorized organ communicates in writing its decision to the environmental impact assessment expert. Within twenty-four (24) hours of receipt of the decision, the environmental impact assessment expert must submit a copy of the written decision by the authorized organ on the environmental impact assessment to the developer.

The ESIA is in direct compliance with the provision of this law, as this project is part of Category 1, requiring a full ESIA process.

II.2.7 Prime Ministerial Order determining the responsibilities, organization and functioning of Committees in charge of the environment conservation and protection (Nº 126/03 of 25/10/2010)

The environmental Committees are established at Provincial, City of Kigali, District, Sector and Cell levels. The responsibilities of these Committees include (Art 3):

1) Ensuring the implementation of the laws, policies, programmes and plans relating to the protection, conservation and promotion of the environment in Rwanda;
2) Monitoring issues relating to awareness raising of the population on environment protection and proper land use; and
3) Ensuring that persons who destroy the environment are pursued by the competent institutions.

Every Environment Committee is in charge of overseeing the functioning of the committee below it in hierarchy. However, responsibilities are specific at each level, i.e. Provincial and City of Kigali (Art 4), District (Art 5); Sector (Art 6); and Cell (Art 7).

Art 8,9,10, 11, 12 are related to the Composition of the Committees at Provincial, Kigali City, District, Sector and Cel levels respectively; whereas their functioning is detailed under Art 13 (selection of leader); Art 14 (Term of service for Committee); Art 15 (Time and procedures for calling Committee meetings); Art 16 (Decision making process); Art 17 (Submission of Reports); and Art 18 (Cessation of service by Committee members).

The environmental committee at appropriate level (Provincial, City of Kigali, District, Sector) shall be considered for the implementation of the project, and the ESMP.

II.2.8. Instruction issued by the Rwanda Environmental Management Authority (REMA) and governing Inspection Process in Environmental Matters (No 001 of 10/01/2020)

Art 2 of this Instruction defines the Inspectors as staff in charge of environmental management in the Authority in charge of environmental management, in the City of Kigali and in all Districts.

Art 3 describes the mission of an inspector as:

1. ensure that all projects, activities and products conform to applicable laws and to environmental standards;
2. prepare inspection report and advise his / her institution on measures to be taken;
3. provide the inspected person with technical recommendations related to environmental management following the inspection findings

The powers of inspectors are detailed in Art 4 as following:

1. to inspect installations, factors, stores, shops and retails outlets, construction, houses, machines, vehicles, devices and products;
2. to inspect records relating to the operations of the factory;
3. to take a sample of elements suspected of degrading the environment, measures, take action and propose the way forward;
4. to provisionally suspend or ban activities or materials considered to degrade the environment;
5. to impose an administrative fine provided for the relevant law;

Subsequent articles elucidate the conditions and process for inspection i.e. Inspection Notice (Art 5); Security measures (Art6); Inspection timing (Art 7).

Art 8 elaborates on key elements that an inspection needs to consider: all aspects of the project or activity with direct link to environment, including but not limited to:

1. if the site for the project activity is appropriate;
2. if the project or activity has got all required clearances;
3. if the product or activity is allowed;
4. if the environmental management plan was developed and is complied with;
5. if the technical standards are complied with;
6. if the health and security measures are taken and implemented.

Art 9; 10; and 11 highlight respectively the roles, obligations and rights of the inspected person.

During the inspection process, the inspector should record all key findings (these have to be countersigned by the inspected person or his / her representative on the site) (Art 12). The inspector may also take samples of products for further analyses (costs for these analyses are to be born by the inspected person) (Art 13). Furthermore, the inspector issues to the head of the institution an inspection report, highlighting details and evidence of the activities / products harmful to the environment and that are found during the inspection as well as recommended measures (Art 14). Inspector must also keep a registry of all inspection conducted (Art 15).

Art 16 specifies that the inspected person, who has received the inspection findings notification, shall submit to the institution which has conducted the inspection note containing remedial measures as well as an implementation plan that he/she will be undertaking in order to protect the environment. This implementation plan should include indicators, targets, responsible institution and timeframes. Upon completion of execution of adopted measures, the inspected person shall officially inform the institution which inspected him/her.

Art 17 provides for an administrative fine imposed through an imposition note duly signed by the Head of the Institution or the inspector, indicating inter alia, the amount to be paid, committed fault and the legal basis as well as the scene. The fine shall be paid through a specific account of the Fund for Environment.

The inspected person has the right to appeal against a decision after an inspection. The appeal must be addressed to the Director General of the Authority in charge of Environment, if the decision was taken by the City of Kigali or District (Art 17) or to the Minister in charge of Environment if the decision was taken by the Authority in charge of Environment (Art 18). In both cases, the appeal must be lodged within 15 calendar days of the receipt of the Inspection Report. With this appeal, the inspected person may request another inspection to be carried by an independent and competent expert, at the expenses of the inspected person. The Report of the Independent Expert shall be submitted to the concerned authority within 60 days (however the Independent Expert may request more days to complete the task) (Art 20).

The decision on the appeal shall be taken and communicated in writing to the person who made the appeal within 15 calendar days from the reception of the case, or the expert's report (Art 21).

In situation of the obstruction of the inspection, the person obstructing the inspection shall be charged of a fine provided by the law; if the obstruction persists, the owner shall be ordered to temporary stop his / her activities until the person is ready to cooperation with the inspection teams.

The implementation of the project / ESMP shall be in line with the provision of this Instruction by REMA.

II.2.9. Law governing electricity in Rwanda as modified to date (No 52/2018 of 13/08/2018 – modifying law No 21/2011 of 23/06/2011)

This Law governs activities of electric power production, transmission, distribution and trading within or outside the national territory of the Republic of Rwanda.

This law establishes a system of authorizing licenses for transmission, distribution and sale of electric power (Art. 5). The license is obtainable after a due filled application and payment of an license fee as determined by the regulatory agency.

Art. 8 under this law stipulates that the regulatory agency ensures prior to the issuance of a license, that the concerned individual or institution respect the rights of users and environment protection.

Under this law, there is an establishment of Universal Access Fund whose main purpose is to optimize access to electricity in all areas of the country through cost effective means and minimized support. A Presidential Order determines the functioning of the Universal Access Fund.

With regards to the Right of Way, Art 47 provides for an authorization to operate in a public or a private domain to be granted for electricity transmission or distribution license holder. However the Art 48 provides for an Expropriation of right of way for public interest. The right of way is necessary to the operators in production, transmission, distribution and supply of electricity. It shall be exercised in accordance with the standards set by the regulatory agency. Expropriation shall be conducted in accordance with the Law governing expropriation for public interest.

In case of issues arising from interference with property, Article 49 provides for their settlement and stipulates that complaints from license holders regarding interference with their property, including right of way, shall be brought to the regulatory agency for handling, and when deemed necessary, to the courts in accordance with laws.

II.10. National Social Protection Strategy (MINALOC 2011)

This Strategy defines social protection across two main dimensions:

- As a Social Protection Sector, which essentially comprises the system of regular and predicable cash transfers that will provide income support to those living in poverty and vulnerable to falling into poverty;
- As a means of ensuring access to other public services – such as health and education – by enabling poor households to overcome the financial barriers that they may face.

In addition, the Strategy sets out a number of social development initiatives and complementary activities to social protection focused on helping poor households graduate out of poverty. The Social Protection Strategy plays an important role in enabling the government to tackle poverty and inequality across Rwanda. It complements other sector strategies already in place, and is focused on enabling Rwanda to achieve its commitments as set out in the NST1 and the Vision 2050. In recent years Rwanda has managed to achieve a good level of economic growth. However, there is still much to reduction are to be achieved. In 2006, almost 57 percent of the population still lived in poverty, while levels of inequality were on the rise. A number of categories of the population are particularly vulnerable poverty including older people, those living with disabilities, young children, female-headed households, genocide survivors and the historically marginalised. Young people are a group that also need support, given the difficulties many have in finding jobs due to low skill levels

II.10. Law regulating labour in Rwanda (N° 66/2018 of 30/08/2018)

Labour law is fundamental in creating and maintaining employee relations, high productivity and a conducive work environment. Rwanda repealed the labour law in 2018 to align it to international best practice. The new labour law distinguishes between collective and individual labour disputes. Collective labour disputes refer to 'disagreements between one or more employers on the one hand, and some or all employees on the other hand, which arises from collective convention or working conditions' (Art. 3 clause 10, p.23). An individual labour dispute is defined as ' a disagreement between one or more employees and an employer as a result of a breach of the employment contract concluded between them'(Art 3 clause 11, p.24). The laws of Rwanda eliminate many potential causes of grievances in the workplace by prohibiting some

forms of child labour, all forms of discrimination, forced labour, and sexual harassment. Minimum age for admission of employment is 16 years except that 13 – 15 years old children can do light work under apprenticeship. Children who are 13 years old and above can be employed for light work which does not have detrimental effect on education, health and physical development or other aspects of child's interest (Art.3). The labour law guarantees right to freedom of opinion and association regarding working conditions, execution of work, and organization. These freedom includes right of employees and employers to form, join and participate in employees' or employers' associations respectively (Articles 83 and 84). These associations have to be registered under the law (Art 85) and they enjoy legal personality after publication of their Articles in the Official Gazette of the Republic of Rwanda (Art 86). Legal personality grants the associations power to file cases in courts of law, represent employees or employers, acquire property, enter into agreements with other associations.

In accordance with this law, an employer is responsible to maintain health and safety of the workers at workplace. Employer is required to keep the workplace in a common state of cleanliness and presentation of hygiene & safety necessary for the health and safety of workers. The project implementers will uphold the provisions of this Act on the rights of the workers including right of employees to organise themselves in a labour union. Furthermore the contractor shall also take note of the following orders:

- Ministerial Order Determining Conditions For Occupational Health And Safety (N°02 Of 17/05/2012)
- Ministerial Order Determining Modalities Of Establishing And Functioning Of Occupational Health And Safety Committees (N°01/Mifotra/15 Of 15/01/2015)

II.3 Institutional framework

II.3.1 Environment Institutional Actors

a) Ministry of Environment

The Ministry of Environment (MOE) was established to ensure the conservation, protection and development of the environment. It also ensures the safeguard of green and climate resilience for growth of the economy. MoE has the vision of protecting the environment for the safeguard of green and climate resilient Rwanda for growth of the economy. It, therefore, also oversees the environmental aspects of the energy sector and is responsible for the coordination and implementation of legislation and policies relating to the environmental impacts of energy production and consumption.

As stipulated in the Prime Minister's Order Nº 131/03 Of 23/12/2017 determining Mission and Functions, Organisational Structure, Job Profiles, Salaries and Fringe Benefits for Employees of the Ministry of Environment (MoE), the Ministry of Environment has the following main responsibilities:

1. To develop and disseminate the environment and climate change policies, strategies and programs through:
    - to develop strategies to promote partnership and enhance capacity of private sector to invest in activities of environment and climate change for sustainable economic development;

- to develop laws and regulations to ensure protection of the environment and conservation of natural ecosystems;
- To develop institutional and human resources capacities in environment and climate change.

2. To monitor and evaluate the implementation and mainstreaming of environment and climate change policies, strategies and programs across all sectors, especially productive sector;
3. To oversee and evaluate institutions under its supervision by providing guidance on the implementation of specific programs to be realised by the institutions under its supervision and local government;
4. To mobilize the necessary resources for the development, protection and conservation of the environment for the climate change adaptation and mitigation.

MOE is headed by the Minister, aided by the Perment Secretary and counts 4 Technical Units, each headed by the Director General that divide responsibilities to implement the MOE's programs:

1. Environment and Climate Change Unit;
2. Land, Water and Forest Unit;
3. Mining Unit; and
4. Finance & Administration Unit

MOE has specific Authorities with specific mandates to implement particular programs related to Environment and Natural Resources management, namely:

1. Rwanda Environmental Management Authority (REMA)
2. Rwanda Land Management & Use Authority (RLMUA)
3. Rwanda Water & Forestry Authority (RWFA)
4. Rwanda Green Fund (FONERWA)
5. Rwanda Meteorological Authority (Meteo-Rwanda)

b) Rwanda Environmental Management Authority (REMA)

Under the supervision of the Ministry of Environment, from the Law n°63/2013 of 27/08/2013 determining the mission, organization and functioning of Rwanda Environment Management Authority (REMA), REMA reserves the legal mandate for national environmental protection, conservation, promotion and overall management, including advisory to the government on all matters pertinent to the environment and climate change.

The mission of REMA is to promote and ensure the protection of the environment and sustainable management of natural resources through decentralized structures of governance and seek national position to emerging global issues with a view to enhancing the well-being of the Rwandan people.

REMA has a vision of ensuring that all sectors of the Rwandan Society value and undertake sound environmental management and rational use of natural resources in order to contribute to the national aspirations for sustainable development.

According to the said law instituting REMA, the following are the main responsibilities of REMA:

1. To implement Government environmental policy;
2. To advise the Government on policies, strategies and legislation related to the management of the environment as well as the implementation of environment related international conventions, whenever deemed necessary;
3. To conduct thorough inspection of environmental management in order to prepare a report on the status of environment in Rwanda that shall be published every two (2) years;
4. To put in place measures designed to prevent climate change and cope with its impacts;
5. To conduct studies, research, investigations and other relevant activities in the field of environment and publish the findings;
6. To closely monitor and assess development programs to ensure compliance with the laws on environment during their preparation and implementation;
7. To participate in the preparation of activities strategies designed to prevent risks and other phenomena which may cause environmental degradation and propose remedial measures;
8. To provide, where it is necessary, advice and technical support to individuals or entities engaged in natural resources management and environmental conservation;
9. To prepare, publish and disseminate education materials relating to guidelines and laws relating to environmental management and protection and reduce environmental degradation risks;
10. To monitor and supervise impact assessment, environmental audit, strategic environmental assessment and any other environmental study. REMA may authorize in writing, any other person to analyze and approve these studies.

Also Art 4 of the said law grants REMA powers enabling it to fulfill its mission. These powers are:

1. to request any concerned institution or organ to submit an environment status report;
2. to visit without prior notice any project, building, industrial and business site in order to conduct inspection of activities harmful to environment;
3. to investigate offences in accordance with Law on Environment determining the modalities of protection, conservation and promotion of environment in Rwanda;
4. to order the suspension of activities contrary to the provisions of Law on Environment determining modalities of protection, conservation and promotion of the environment in Rwanda and other laws relating to the protection of environment;
5. to confiscate from any person various objects prohibited by laws relating to the protection of environment;
6. to receive aid, subsidies or donations; and
7. To grant awards and subsidies in order to sensitize people on environmental protection.

REMA as a parastatal is headed by the Director General, aided by the Deputy Director General and counts 5 Technical Units, namely:

1. Environmental Regulation & Pollution Control;
2. Research, Environmental Planning & Development;
3. Environmental Education & Mainstreaming;
4. Climate Change & International Obligations; and
5. Finance & Administration

c) Rwanda Development Board (RDB)

The Rwanda Development Board (RDB) is a government department that integrates all government agencies responsible for the attraction, retention and facilitation of investments in the national economy. RDB was established in 2009 to coordinate, spur and promote national economic development. The Executive Director's position, is a cabinet-level position and the incumbent is appointed by and reports directly to the president of Rwanda. RDB measures its achievements in (a) direct foreign and domestic investments, (b) increased exports and (c) number of jobs created.

RDB is evidence that Rwanda is open for business. It is truly a one stop shop for all investors. It was set up by bringing together all the government agencies responsible for the entire investor experience under one roof. This includes key agencies responsible for business registration, investment promotion, environmental clearances, privatization and specialist agencies which support the priority sectors of ICT and tourism as well as SMEs and human capacity development in the private sector.

The RDB is independent and influential. It reports directly to the President and is guided by a Board that includes all the key Ministers (e.g., Finance, Trade, Infrastructure, and Agriculture). RDB is built with global expertise. It is modeled on international best practice examples of Singapore and Costa Rica. It has advisory and hands-on support from global entrepreneurs and experts from Singapore Development Board, World Bank, IFC and the Office of Tony Blair.

RDB's vision is to transform Rwanda into a dynamic global hub for business, investment, and innovation. Its mission is fast tracking economic development in Rwanda by enabling private sector growth.

As an agency for tourism promotion, RDB is also the overall agency for management of national parks, and therefore delivers the permission to undertake any activity within the limits of those national parks.

RDB deals also with issuing of EIA Certificate for investment projects in the bid to ease business in Rwanda.

In a bid to customize the EIA related provisions of the Law on Environment (N°48/2018 of 13/08/2018) and those of the Ministerial Order establishing the list of Projects that must undergo Environmental Impact Assessment, Instructions, Requirements and Procedures to conduct Environmental Impact Assessment in Rwanda (No 001/ 2019 of 15/04/2019), RDB has issued the following guidelines in relation to EIA process

1. *Before commencing implementation of business projects, investors are required to cross check whether their projects are required to undergo an EIA, and application for EIA Certificate should be addressed to RDB.*
2. *Procedures for obtaining an EIA Certificate*

Step 1 – Submitting Project Brief by Investor / Developer

A project brief must be elaborated in such a manner that the RDB assessor easily understands all the aspects of the project. The project brief must contain at minimum:

- Name and address of the project developer;

- Main objectives of the project;
- Main components of the project and its variants;
- Description of the proposed site of the project with an emphasis on the main characteristics of the area such as soil properties, existing planned activities in the areas, existing ecosystems such as forests, rivers, lakes, water sources, wetlands; data on weather characteristics (rainfall, etc…;
- Size and expected duration of the project;
- Planned activities for the implementation of the project with the equencing and duration of each phase;
- Type and quantity of the product output and raw materials;
- Main materials to be used and planned staffing
- Estimated project cost (if available)
- Any drawing or photos

Step 2 – RDB conducts a site visit

RDB upon receiving the project brief plans to conduct a site visit upon which terms of reference are prepared and transmitted to the developer. These terms of reference serve as the basis for carrying out an Environmental Impact Assessment (EIA) Study for the project. Developers can also prepare their own terms of reference and condition that he/she gets approval from RDB.

Step 3 – Conducting the EIA Study

Based on the terms of reference, the developer at his / her own expenses, commissions an EIA Study and submits the findings to the RDB. A list of EIA Experts is published by the Rwanda Association of Professional Envionmental Practitioners – RAPEP. Should the developer prefer to use an Expert who is not registered with RAPEP, he may submit to the Authority for approval.

Step 4 – RDB issues the EIA Certificate

Once confirmation of compliance has been made by the RDB, an EIA Certificate is provided to the developer. The process takes 15 days maximum.

Time frame for EIA Certificate

- RDB submits terms of reference for EIA Study within 15 working days of the reception of the project brief;
- RDB notifies the acceptance of refusal of the choice of the experts within 5 working days after reception of choice of team of experts; In case of refusal, RDB provides justification and recommends experts;
- Upon the reception of the EIA Study Report, RDB analyses the report to verify its conformity with the terms of reference. The Authority accepts to issue the EIA Certificate or requests additional information from the developer within 20 days;
- If RDB deems it necessary, it provides a public hearing notification within 15 days from the date of public notification

3. Appealing an RDB EIA Decision

Where a project is not approved, the developer may appeal against the decision of the RDB to the Ministry of Environment within 30 days from the date of the notification of the decision.

d) Rwanda Association of Professional Environmental Practitioners (RAPEP)

The Rwanda Association of Professional Environmental Practitioners (RAPEP) is a professional association comprising environmental practitioners licensed to operate in the Republic of Rwanda and recorded on its register; and established by Law No 36/2016 of 08/09/2016. The Law determines also its organization and functioning.

RAPEP has legal personality and financial and administrative autonomy (Art 3) and has currently its Head Quarters in Kigali, the Capital City of the Republic of Rwanda. Art. 6 defines the responsibilities of RAPEP as follows:

1. To gather environmental assessment practitioners;
2. To analyze and find solutions to all problems related to the environmental assessment practitioners' profession;
3. To promote professionalism and proper conduct of members of RAPEP;
4. To exchange information relating to the environmental assessment practitioners' profession;
5. To represent interests of environmental assessment practitioners and advocate for them in Rwanda and abroad.

The organs of RAPEP (art. 9) include: (1) the General Assembly; (2) the Executive Committee; and (3) the Executive Secretariat; the law determines the composition, responsibilities, functioning and decision making processes inherent to each RAPEP's organ. The Executive Committee, composed of 5 members including the Chairperson, Deputy Chairperson, the Secretary and two (2) Advisors, is responsible for the functioning of RAPEP (art. 15). All the members of the Executive Secretariat are elected by the General Assembly for a 3 year term renewable once. However, the Executive Secretary, supported by recruited staff, is responsible for the daily management of RAPEP activities. Art. 19 defines in details the responsibilities of the Executive Secretary.

Furthermore, this law (Art 24) establishes also the Regulatory Council as a statutory organ responsible for organizing and supervising the environmental assessment profession, and defines also the modalities for appointment of its members, and its functioning. As per Art 28, the responsibilities of the Regulatory Council are as follows:

1. to approve regulations and guidelines governing the environmental assessment practitioners' profession;
2. to advise Government on the organisation of the profession;
3. to monitor and exercise supervision and control over environmental assessment practitioners;
4. to take measures against the environmental assessment practitioners having committed professional misconduct;
5. to submit a quarterly activity report to the Minister;
6. To notify RAPEP of instructions and decisions of the Regulatory Council.

Art 29 defines composition, functioning of the Regulatory Council.

It is clearly precised by this law that only licensed environmental practitioners appearing on RAPEP register are authorized to conduct an environmental impact assessment or an environmental audit (Art 31). However, a civil servant appearing on RAPEP register is not allowed to conduct environmental impact assessment and environmental assessment as long as he/she remains in service, with the exception of lecturers and researchers in institution of higher learning and universities. On the other hand, the Executive Committee of RAPEP publishes the list of environmental assessment practitioners not later than 31July of each year, with a copy to the Minister (Art 39). The law precises also the conditions for the registration on and removal from the RAPEP Register of Environmental Practitioners.

It further clarifies the modalities inherent to the Organization of Environmental Assessment Practitioners' Profession in Rwanda.

RAPEP commenced its activities during the first and constituting General Assembly meeting, that was called on by the Minister of Environment and held in Kigali on Feb 9th 2017. This meeting elected also members of the RAPEP Executive Committee. Since this day, RAPEP started officially its duties, principally with the registration and deliver licenses to the environmental practitioners fulfilling the conditions as per the law.

II.3.2 Institutional actors in the electricity sector

a) Ministry of Infrastructure (MININFRA)

The Ministry of Infrastructure (MININFRA) is responsible for four sectors: transport, energy, water and sanitation, urbanization-human settlements and housing. For the energy sector, MININFRA is in charge of the formulation, monitoring and assessment of policies and programs. Its mission is also to ensure the existence of a proper power generation capacity producing cost-effective energy, and to initiate programs to increase access to affordable energy and services. MININFRA ensures that quality standards and norms are implemented and is responsible for human resource capacities in the sector.

It supports infrastructure within the districts and is also responsible for harmonizing national infrastructure with regional plans (EAC). It has a role to promote private sector investment. MININFRA is mandated to "orient and supervise the functioning and management of public institutions, agencies and companies under the Ministry", including the Rwanda Energy Group (REG) and its subsidiaries. Under Law N°21/2011 of 23/06/2011 Governing Electricity in Rwanda, the MININFRA approves electricity tariffs.

MININFRA is composed of different departments, including in particular a Policy and Planning Department supported by a Planning Division, and overseeing sector Divisions, including an Energy Division.

- Policy & Planning Department;
- Planning Division;
- Energy Division, comprising:
    - Division Manager (1);
    - Hydropower Energy Senior Engineer (1);
    - Fossil Energy Senior Engineer (1);
    - Energy Transmission & Distribution Senior Engineer (1); and

- Energy Economist (1)

As part of its mandate, MININFRA is also running two capacity building programs including local and international training, exchange and coaching, namely: The Young Engineers Skills Development Program (YESDP) and the Strategic Capacity Building Initiative (SCBI). It is organized in coordination with the Ministries of Education, Finance, the Ministry of Public Service and Labor, the National Capacity

Building Secretariat, development partners and local universities.

MININFRA and the Energy Sector Wide Approach (eSWAP)

Rwanda adopted a Sector Wide Approach (SWAP) to foster the Government's and donor's efficiency in the energy sector. It was first set up in 2008 between the Government, the AfDB, the WB, the EC,

Belgium and the Netherlands. The eSWAP in Rwanda encompasses all donors active in the sector under one common sector investment program and ensures cross government coordination in energy related matters. In particular, the EARP is part of this sector wide approach which led to the development of a least cost rollout plan, medium term priority connection targets, a rollout strategy and a financing policy platform. The eSWAP Secretariat is hosted by the MININFRA and composed of four staff:

- Coordinator (1);
- Energy Policy & Economics Sepcialist (1);
- Monitoring & Evaluation Specialist (1); and
- Office Assistant (1)

The Energy Sector Working group (ESWG)

The ESWG, chaired by the MININFRA, is a high level coordination and advisory body for the energy sector, which includes the key stakeholders, key ministries, government agencies, development partners, private sector representatives, civil society and NGOs.

b) Rwanda Energy Group Ltd (REG)

The Rwanda Energy Group Ltd (REG) and the Water and Sanitation Corporation Ltd (WASAC) result from the split in July 2014 of the former Energy and Water Sanitation Agency (EWSA). EWSA was created in 2011 by integrating the Rwanda Energy Corporation (RECO) and the Rwanda Water and Sewerage Corporation (RWASCO). Both formed ELECTROGAZ before the national monopoly was unbundled in 2008.

REG's vision is "to be the most efficient and customer centric utility company in the region". It aims to transform the industry, its dynamic and performance, and to reinforce its customer centered operations in order "to provide sufficient and quality electricity to our customers at affordable and sustainable rates that support the socio-economic development of the country."

REG's key objectives are:

- Financial: Achieve financial solvency for the company
- Technical: Improve the scope and reliability of the supply and distribution of electricity from REG, including requests for new connections for all provinces and for all type of customers
- Operational: Increase the efficiency of REG operations, reducing cost and increasing the amount of electricity produced per employee.
- Commercial: Drastically improve the commercial operations and services of REG.

Prime Minister's Order Nº 87/03 of 16/08/2014 determined the modalities of transfer of responsibilities and property of the Energy, Water and Sanitation Authority (EWSA). Since REG Ltd has taken over the energy operations formerly under EWSA, the Group is composed of two subsidiaries, namely Energy Utility Corporation Limited (EUCL) and Energy Development Corporation Limited (EDCL).

The Energy Utility Corporation Limited (EUCL) is the subsidiary utility in charge of the day-to-day operation of generation facilities, transmission and distribution networks and the sale of electricity. EUCL plans the transmissions and distribution grids. Its current focus is geared toward consumer satisfaction, demand side management, technical and non-technical loss reduction and energy efficiency. As the sole power off taker in the country, EUCL is also responsible for negotiations and entering into Power Purchase Agreements with Independent Power Producers.

Energy Development Company Limited (EDCL) is the subsidiary in charge of developing new generation, transmission and energy access development projects. EDCL's mission is to develop new energy resources locally, bolster investment and develop projects in this field. It is also responsible for reviewing the power master plan and defining a least-cost power development plan. EDCL is therefore also in charge of regional power integration with neighboring countries and power pools. EDCL works closely with MININFRA.

REG is strengthening its corporate structure

As the REG structure is relatively new it faces high strategic challenges. There is therefore an ongoing effort to reinforce the corporate structures and their institutional capacity, including by recruiting talented new staff. With KPMG's support, a recruitment campaign has been launched covering all functions

(Directors, Chief Engineers, Heads of Units, and officers, etc.), and currently seeking 3 executives for the REG Ltd Holding, 20 executives for EUCL and 20 for EDCL. If necessary, during its needs assessment phase the Project will therefore take a specific approach and deeper look at the needs of this new staff for a well-structured capacity strengthening path, accompanied by national experts or international technical assistants, as part of the corporate and Project's capacity building program. In this spirit, the National Capacity Building Secretariat (NCBS) and Belgian Technical Cooperation (BTC) are also assisting EUCL, not only with incentivizing highly skilled local staff, but also through foreign technical assistance. Under 11th European Development Fund (EDF) support the EU has set aside funds for institutional capacity, and REG is one of the major beneficiaries of this support. To this effect, the EU Delegation has hired a consultant to work on establishing the capacity needs and devising a

capacity building strategy and implementation framework within the coming five years. The consultant will coordinate closely with NCBS and BTC in the framework of this Project.

REG Capacity Building Task Force

The REG Capacity Building Task Force was created following the Government's adoption of a strategic approach to capacity strengthening addressing identified constraints that affect the country's growth. The energy sector was identified as a key priority area and the Rwandan energy policy emphasized the need for capacity-building. The Task Force is a group composed of 6 members of the REG's top management. They do not work full time for the Task Force, rather in addition to their normal positions. The objective of the Task Force is to develop and supervise capacity building activities within all the units of the REG. The Task Force has led the compilation of the Capacity Building plans for REG, in coordination with the NCBS and the EARP staff dedicated to capacity building. The overall objective of the Task force in terms of capacity is targeted at achieving, by 2018, a sufficient set of skills in order to be able to carry out internally 80% of the project preparation and implementation activities for all existing and new projects. During the 2 years of implementation of our Project, the Task Force will be constantly made aware of all its developments and will be closely associated to the decision making. We also expect that a member of the Task Force will dedicate some time to the interaction with the Project experts and will supervise the training programme implemented by the Consultant.

The Electricity Access Roll-out Program (EARP)

Government, in partnership with development partners, launched the Rwanda Electricity Access Roll out Programme (EARP) in 2009 as its flagship programme to realise the primary electricity access targets of the EDPRS. Access to electricity has increased significantly in recent years, to 34.5% as at June 2017, and by the end of the NST-1 period will be at 100% for households. Expansion of the grid will continue through the Energy Access Roll-out Program (EARP), with 52% of households connected to the grid. However, analysis has shown that grid connections will be economically inefficient in the short-to-medium term for households which use small volumes of electricity. Further, grid expansion is a slow process and it will take decades to reach all households. Therefore, off-grid solutions, including solar home systems (SHS), will play a key role. Off-grid technologies and commercial structures have developed significantly in recent years and now present a viable alternative to grid connections. The Rural Electrification Strategy (RES) published in June 2016 sets out a clear development plan for the off-grid sub-sector. It is expected that 48% of all households will have their electricity needs met by off-grid solutions by 2024.

REG Strategic Plan 2019 – 2024

This Strategic Plan focuses on improving the planning and implementation of energy projects appropriate to meet the energy supply requirements and efficiently operating the supply infrastructure to sustainable deliver reliable and affordable energy in the household and commercial usage. The key strategic objectives in this plan are:

- Generation: Build a balanced and cost optimized generation mix sufficient to meet growing demand;

- Transmission: Plan and build infrastructure to ensure timely alignment of current and future generation with national demand;
- Distribution: Develop and operate an optimized distribution network to enhance utility efficiency and reliability of power supply;
- Electricity access: Achieve 100% National Access to Electricity in 5 years using grid and off-grid solutions;
- Tariff evolution: Develop a clear tariff trajectory with clear milestones based on effective engagement with IPPs, financiers and other stakeholders to achieve affordable tariff;
- Operation & Maintenance: Ensure optimized plant and network operations for excellent service reliability, with most economical plan.

This Strategic Plan has been developed in tandem with policy goals in the NST1. Along the path of its implementation, any consequential amendments to the Strategic Plan will be fully motivated and communicated to stakeholders once this becomes necessary.

c) Rwanda Utilities Regulatory Agency (RURA)

Rwanda Utilities Regulatory Authority (RURA) was initially created by the Law n° 39/2001 of 13 September 2001 with the mission to regulate certain public Utilities, namely telecommunications network and/or Telecommunications services, electricity, water, removal of waste products from residential or business premises, extraction and distribution of gas and transport of goods and persons.

This Law was further reviewed and replaced by Law Nº 09/2013 of 01/03/2013 establishing Rwanda Utilities Regulatory Authority (RURA) and determining its mission, powers, organization and functioning. This Law gives to RURA the mandate to regulate:

- Telecommunications, information technology, broadcasting and converging electronic technologies including the internet and any other audiovisual information and communication technology;
- Postal services;
- Renewable and non-renewable energy, industrial gases, pipelines and storage facilities;
- Water;
- Sanitation;
- Transport of persons and goods;
- Radiation Protection; and
- Other public utilities, if deemed necessary.

The same Law gives to the Authority a legal personality, financial and administrative autonomy in the fulfillment of its mandate. The Authority plays a pivotal role between the policy maker, licensed service providers and consumers. The Authority reports to the Office of the Prime Minister and it coordinates with line ministries responsible for each regulated sector in executing its functions.

In addition to the law creating RURA, there is a number of other legal and regulatory instruments which help RURA to discharge its responsibilities in each specific sector to be

regulated. In the same vein, the Authority has the mission to ensure fair competition, promoting and protecting consumers' interests and rights in regulated sectors.

To be able to regulate public utilities, the Law Nº 09/2013 of 01/03/2013 gives to the Authority the following missions:

- To set up necessary guidelines in order to implement laws and regulations in force;
- To ensure compliance by public utilities with the provisions of laws and regulations governing the regulated sectors in an objective, transparent and non-discriminatory manner;
- To ensure the continuity of service delivery by the licensed or authorized service providers and the preservation of public interest;
- To protect users' and operators' interests by taking measures likely to guarantee effective, sound and fair competition in the regulated sectors within the framework of applicable laws and regulations;
- To protect and promote consumers' interests;
- To promote the availability, accessibility and affordability of regulated services to all consumers including low income, rural and disadvantaged consumers;
- To promote efficient development of regulated sectors in accordance with Government economic and financial policy;
- To promote and enhance general knowledge, sensitization and awareness of the regulated sectors including but not limited to:
- Promote and protect the rights and obligations of consumers and service providers;
- Issuing permits, authorizations and licenses required for regulated sectors, in accordance with the relevant laws and regulations;
- To monitor and ensure compliance by regulated network or service providers in line with their licenses, permits and concession obligations;
- To ensure fair competition in all regulated sectors.

To fulfill this mission, the Authority is vested with the powers including among others: carrying out investigations including inspections at service delivery sites; imposing administrative sanctions in case of a violation of laws and regulations; facilitating settlement of disputes related to regulated services; issuing directives to the regulated service provider as well as regulating tariffs.

II.4 International conventions and treaties

Rwanda is signatory of several international conventions or treaties with a direct link with biodiversity management and environment protection. Those are presented in Table 7.

Table 6- International Conventions to which Rwanda is party

No	Title of the Convention / Traeaty	Subject of the Convention
1	Convention on Biological Diversity of 5 June 1992	Biological diversity conservation, sustainable use of its components and fair and equitable sharing of benefits resulting from genetic resource harvest
2	Cartagena protocol to the Convention on Biological Diversity on Biosafety, adopted on 29 January 2000 and entered into force on 11 September	It is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity,

No	Title of the Convention / Traeaty	Subject of the Convention
	2003.	taking also into account risks to human health.
3	Convention on International Trade in Endangered Species of Wild Fauna and Flora « CITES » of 3 March 1971	Control over international trade in species of wild fauna and flora that are, or might be, threatened with overexploitation
4	«RAMSAR Convention» on Wetlands, 1971	Convention relating to Conservation and rational use of Wetlands of International Importance, especially as waterfowl habitat and their resources
5	Convention on Conservation of Wildlife Migratory Species (CMS)	Conservation of migratory species whose major portion regularly and predictably crosses over one or several boundaries of domestic jurisdiction
6	African Convention on Conservation of Nature and Natural Resources	Adoption of measures for conservation, use and development of soils, water, flora and fauna in compliance with scientific principles and in the interest of populations
7	Convention on Plant Protection among State Members of the Great akes Countries' Economic Community « CEPGL » of 25 February 1990	The convention aims at promoting cooperation in terms of plant protection among the CEPGL countries through its Agricultural and Animal Research Institute (IRAZ) and national bodies in charge of plant protection
8	Phytosanitary Convention for Africa of 13 September 1967	This convention aims at strengthening cooperation among African countries in fighting plants and crop products' enemies, and preventing their introduction and dissemination on national territories.
9	African Convention on Conservation of Nature and Natural Resources	To increase environment protection, to encourage conservation and sustainable use of natural resources, and to harmonize and coordinate policies
10	United Nations Framework Convention on Climate Change (UNFCCC)	To stabilize atmospheric concentration of greenhouse gases at a level that would prevent dangerous man-induced interferences with the climate system
11	Kyoto Protocol [extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC)], adopted on 11 December 1997 and entered into force on 16 February 2005	The Kyoto Protocol is an international treaty which commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that (part one) global warming is occurring and (part two) it is extremely likely that human-made CO_2 emissions have predominantly caused it.
12	Paris Agreement on Climate Change within the United Nations Framework Convention on Climate Change, adopted by consensus on 12 December 2015. As of February 2020, all UNFCCC members have signed the agreement, 189 have become party to it	The Paris Agreement deals with greenhouse-gas-emissions mitigation, adaptation, and finance, signed in 2016. The agreement's language was negotiated by representatives of 196 state parties at the 21st Conference of the Parties of the UNFCCC in Le Bourget, near Paris, France, and
13	United Nations Convention to Combat Desertification	Its objective is to combat soil erosion and desertification in affected countries.
14	Vienna Convention for the Protection of the Ozone Layer It was agreed on 16th September 1987, and entered into force on 1st January 1989.	To protect human health and environment against harmful effects resulting from or that might result from human activities that modify or may modify the ozone layer
15	Montreal Protocol on Substances that Deplete the Ozone Layer (a **Protocol** to the Vienna Convention for the Protection of the Ozone Layer)	It is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. Under the Kigali Amendment countries promised to reduce the use of hydrofluorocarbons (HFCs) by more than 80% over the next 30 years. By December 27, 2018, 65 countries had ratified the Amendment.

No	Title of the Convention / Traeaty	Subject of the Convention
		On January 1, 2019 the Kigali Amendment to the Montreal Protocol came into force
16	Basel Convention on the Control of Transboundary movements of hazardous Wastes and their Disposal	Control of transboundary movements of hazardous wastes and their disposal. It aims at reducing the size of those exchanges in order to protect human health and environment by establishing a control system for exports and imports of hazardous wastes as well as their disposal
17	Bamako Convention on the ban of the import to Africa and the control of transboundary movement and management of hazardouz wastes within Africa.	Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa) is a treaty of African nations prohibiting the import of any hazardous (including radioactive) waste.
18	Rotterdam Convention on promotion of shared information on hazardous chemicals Adopted on 10 September 1998 and entered into force on 24 February 2004	This is a multilateral treaty to promote shared responsibilities in relation to importation of hazardous chemicals. The convention promotes open exchange of information and calls on exporters of hazardous chemicals to use proper labeling, include directions on safe handling, and inform purchasers of any known restrictions or bans.
19	Stockholm Convention on Persistent Organic Pollutants (POPs) Signed in 2001 and effective from May 2004	Is a multilateral environmental agreement to protect human health and the environment from chemicals, known as POPs. POPs have harmful impacts on human health or on the environment. They remain intact in the environment for long periods, become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife. The Convention aims to eliminate or restrict the production and use of persistent organic pollutants.
20	MINAMATA Convention on Mercury Approved by delegates representing close to 140 countries on 19 January 2013 in Geneva and adopted and signed later that year on 10 October 2013	The Minamata Convention on Mercury is an international treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

II.5 International Banks Policies, Procedures and Guidelines

II.5.1 African Development Bank's Operational Safeguards

The African Development Bank Group (AfDB) subscribes to the concept of sustainable development as its benchmark for environmental policy. The concept assumes that the ecological capacity of regeneration and assimilation of natural ecosystems will be kept if defined as: "the acquisition, transformation, distribution, and disposal or resources in a manner capable of sustaining human activities without any reduction in the aggregate natural resource stocks" (AfDB, 2004). Based on the definition provided, the ESIA for any considered project must consider the need to establish a strong connection between the increase of natural capital (resources), poverty reduction strategies (a strong sustainability perspective) and issues related to the populations, a pressure factor in the carrying capacity in natural ecosystems (AfDB, 2004). The Bank's environmental policy has the following general and specific objectives.

General objectives:

- The general improvement in the quality of life of the people of Africa through the support of an environmentally sustainable development; and

- The preservation and increase of ecological capital and life support systems across the continent of Africa.

Specific objectives:

- Increase the carrying capacity of the regional member countries (RMC) through the introduction of innovative technologies, recognized natural and management techniques of reduction of threats to ecosystems;
- Substantially improve the access of disadvantaged/poor environmental resources;
- Help the Projects to acquire capacity to carry out institutional changes in order to achieve sustainable development; and
- Strengthen the partnership with international agencies and network with international, regional and sub-regional organizations for co-ordinate assistance related to the development environmentally sustainable and to promote exchange of information and sharing of the best practices.

The environmental and social safeguards issued by AfDB are the bases of the Bank's support for inclusive economic growth and environmental sustainability. The AfDB has developed an Integrated Safeguard System (ISS) in order to better articulate its safeguard policies while improving their clarity, coherence and consistency (AfDB, 2013; AfDB, 2015). The AfDB ISS sets out the basic tenets that guide the approach to environmental safeguards and five Operational Safeguards (OS) were adopted.

The Operational Safeguard OS 1 sets out he Bank's overarching requirements for borrowers or clients to identify, assess, and manage the potential environmental and social risks and impacts of the program, including climate change issues. OS 1 requires the preparation of an Environment and Social Management Framework (ESMF), which establishes a mechanism to determine and assess potential environmental and social impacts of any Project.

OS from 2 to 5 support the implementation of OS 1 and set out specific requirements relating to different environmental and social issues, including gender and vulnerability issues that are triggered if the assessment process reveals that the program may present certain risks.

The operational safeguards highlighted in the ISS were considered in this ESIA, considering the project potential to trigger some of these safeguards. This implies that the program has limited adverse environmental and social impacts and may trigger the following safeguard policies presented below. For this type of project, a summary of the ESMF should be made available to the public in Rwanda (as the borrowing country), on the Bank's website and through other appropriate channels of disclosure.

Table 7: AfDB OS triggered by the project

S/N	AfDB Operational Safeguard Policy	Summary of core requirements	Triggered under proposed project	Remarks or recommendation for proposed project
1	OS1– Environmental and social assessment	Borrowers or clients are responsible for conducting the environmental and social assessment (Strategic Environmental and Social Assessment, or SESA, or Environmental and Social Impact Assessment, or ESIA) and for developing, as an integral part of project documentation, an appropriate plan for managing possible	Triggered	OS1 is triggered because the project may have different environmental and Social impacts on the environment and the society. Activities of power line construction on environmental services and changes in taxation of fuel/energy sources may pose significant

S/N	AfDB Operational Safeguard Policy	Summary of core requirements	Triggered under proposed project	Remarks or recommendation for proposed project
		impacts. It categorises proposed projects into categories 1, 2, 3, 4 and 9 based on the extent of adverse impacts anticipated from the program.		environmental and social risks. This ESIA aims specifically to fully mitigate all environmental and social impacts in each of the project's sites through the implementation of the mitigation measures prescribed in the ESMP.
2	OS2– Involuntary resettlement: land acquisition, population displacement and compensation	It relates to Bank-financed projects that cause the involuntary resettlement of people. It seeks to ensure that when people must be displaced they are treated fairly, equitably, and in a socially and culturally sensitive manner; that they receive compensation and resettlement assistance so that their standards of living, income-earning capacity, production levels and overall means of livelihood are improved; and that they share in the benefits of the project that involves their resettlement.	Triggered	This project will require that both physical and economic displacement are compensated. The project will fully compensate all assets to be damaged in the right of way or located to each of the project site. Physical relocation will be avoided to the extent possible.
3	OS3- Biodiversity, renewable resources and ecosystem services	This Operational Safeguard (OS) outlines the requirements for borrowers or clients to (i) identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats, and (ii) observe, implement, and respond to requirements for the conservation and sustainable management of priority ecosystem services	Triggered	OS3 is triggered since the project will involve extraction of natural resources including use of water, land in the Right of Way (RoW) or substations locations. Some elements of the flora and faunal species as well as their habitat may be impacted during clearing of vegetation for the RoW of power lines, and substations, which may cause some effect on the local biodiversity.
4	OS 4– Pollution prevention and control, hazardous materials and resource efficiency	This OS outlines the main pollution prevention and control requirements for borrowers or clients to achieve high quality environmental performance, and efficient and sustainable use of natural resources, over the life of a project. It draws on and aligns Bank operations with existing international conventions and standards related to pollution, hazardous materials and waste, and related issues	Triggered	OS4 is triggered because potential environment and social impact due to emissions of pollutants and waste is anticipated during the construction phase of the power lines. Kerosene painted poles also if not managed well constitute the source of soil pollution among others. All activities will be implemented with high consideration of environmental and social safeguards and by respecting the provisions in the ESMP

S/N	AfDB Operational Safeguard Policy	Summary of core requirements	Triggered under proposed project	Remarks or recommendation for proposed project
5	OS5–Labour conditions, health and safety	This OS outlines the main requirements for borrowers or clients to protect the rights of workers and provide for their basic needs. When the borrower or client intends to employ a workforce for a project, it develops and implements a human resources policy and procedures appropriate to the nature and size of the project, with the scale of the workforce in alignment with this OS and with applicable national laws. The OS requires the protection of the workforce through the institution of appropriate health and safety measures considering risks inherent in the particular sector and specific classes of hazards in the borrower's work and does not support the use of child labour and forced labour	Triggered	The Contractor shall comply with the national Labour laws and Best Practice Occupational Health and Safety requirements. Each Contractor will prepare the Labor Management Procedure (LMP) based on the WB requirements and which is specific to the company and Environmental Health and Safety Plan to make sure that he complies with this operational Safeguards.

Chapter III: Description of the Project and Justification

Energy is increasingly proving to be a basic essential without which true development is not possible. So access to energy and, in particular, to electricity is an essential driver for development due to its effect on poverty and hunger, health, education, on improving living conditions, reducing the exodus from the countryside and on the environment. Making electricity available in homes reduces the use of batteries and also the often excessive use of biomass. The use of electricity of hydroelectric origin also makes it possible to prevent the production of greenhouse gases such as CO2 caused by the burning of wood and coal for heating and cooking.

III.1 Project justification

Rwanda is a small but densely populated country of 26,338 km2 with a population of almost 12.8 million people (2019). Recovering from the dramatic events of 1994, the country has embarked on major reforms, including the decentralization of its public administration; judiciary reform; public financial management reforms; restructuring of public institutions and capacity building of public services to strengthen service delivery. The economy has seen significant, sustained growth, with an annual average growth rate of 8.3% since 2000. GDP in 2015 was RWF 4,864 billion or $743 per capita. Agriculture contributes 33% of GDP. Great progress has been made in attracting investment and encouraging entrepreneurship. In 2017, the country ranked 42 amongst 190 world economies in the World Bank Doing Business indicators1. Sustained economic growth is targeted in coming years. Overall national objectives are in place to achieve upper middle-income status by 2035 and high income status by 2050.

However, the economic and social transformation over the NST1 period will be driven by accelerating GDP growth from 2017 onwards, to reach an overall average growth rate of 9.1% over 2017 to 2024. Along this growth path, GDP per capita will reach USD 1,382 and GNI per capita will reach USD 1,320 by the end of the NST1 period.

The government of Rwanda recognizes the vital role that electricity access plays in accelerating economic development through improving health and standards of living. Energy and particularly access to electricity is Government's key priority. This is why significant investments have been made and progress registered led to over 40.5% of households getting access to electricity by August 2017 and why the government has set the target of Universal Electrification (100% access) for the year 2024. The installed energy capacity is today at 237 MW but is to envisaged to grow at 15% rate per annum to reach an installed energy capacity of 554MW by 2024.

To date, 51% Rwandan households have access to electricity, connected to the national grid (37%) or through off-grid systems (14%). As the target is 100% access to electricity, a national electrification plan has been elaborated to ensure that this target is reached in 7 years (by 2024).

As the Government of Rwanda is promoting alternative sources of electricity such as solar home systems, a parallel policy has been approved to encourage people to make productive use of the power on the national grid, in order to bridge the demand-supply imbalance, while

making economic sense of future energy investments. In 5 years (by 2022), 100% productive users will be connected.

The national Policy's approach on access to Electricity is that 52% of national population will be connected through grid extension while 48% will be connected through Off-grid. Currently off-grid connection is at 14%.

To do so, Rwanda is assigning the mission to sector stakeholders ''to create conditions for the provision of sufficient, safe, reliable, efficient, cost-effective and environmentally appropriate energy services to households and to all economic sectors on a sustainable basis". Such is also the focus of Rwanda's longer-term strategic frameworks. Among these national strategic frameworks is the National Strategy for Economic Transformation (NST1) for which one of the strategic goals is to expand electricity access while at the same time improving quality of supply at the lowest possible cost.

The construction of the transmission lines will therefore be a driving force for economic and social development of the country, by improving and increasing electric energy availability. That project will also help to reduce fuel imports required for existing isolated thermal plants and generators. That passage towards a cleaner source of energy will certainly lead to cost saving, but also environmental gains in terms of deforestation reduction, improvement of air quality and reduction of greenhouse gases generated by the use of fossil energies.

To achieve the said objectives, the Government of Rwanda through REG/EDCL is carrying out a number of studies that will guide any future investment in the electricity network.

The overarching objective of the feasibility study is to reinforce the Rwanda transmission network and improve the rate of access to electricity supply for the people of Rwanda. The specific objective of the project is, on one hand, to study the technical, financial, economic and environmental feasibility of the selected transmission lines & sub stations and, on the other, to prepare investment documents for the mentioned projects.

The planned 110kV lines and Substations projects will be help to improve the quality of electricity supply in Rwanda and strengthen the backbone of the transmission network, thus providing additional capacity to cope with the growth of demand, under conditions of safety and quality in line with the requirements of the public electricity service.
The power system analysis of the transmission line and substation using PSS/E and/or DIgSILENT power system analysis models justified the project benefits in terms of technical loss reduction, transit capacity enhancement, safety (N-1), robustness, stability, etc. The simulations will mainly quantify these advantages and disadvantages. The project will generate quantifiable and non-quantifiable technical and economic benefits. As part of the economic analysis of the project, we will consider, among other things, the following benefits:

- Reduction of technical losses; because of better load distribution.
- The increase in energy supply, caused by the access to the network of previously unmet customers because of the capacity limit or the quality of delivery;
- Reduction of CO2 emissions, through access to the network of new customers;
- etc.

III.2 General Location criteria

During the prefeasibility study, the knowledge of the environment, and more specifically of environmental issues and sensible environmental components, helped in the drafting of general criteria that served as guidelines in the study of various alternatives. Those criteria are of two types: restrictive criteria and incentive criteria.

Restrictive criteria urge to avoid as much as possible some elements of the environment because of their intrinsic features. Incentive criteria urge to seek as much as possible some elements of the environment because they provide, among other things, a lower degree of sensitivity to the construction of the line.

The general location criteria considered for the location of transmission lines and the establishment of substations within the framework of this project, and which were selected for the establishment of corridors, are presented below. They were technical, environmental and socioeconomic based, and some can be classified in more than one category:

- To seek the most direct orientation between the starting point and the terminal in order to reduce the length of the line, thus reducing disturbances caused to the biophysical and social environment and reducing the project costs;
- To avoid the fragmentation of the territory and the creation of residual spaces by seeking an orientation of the corridor that would comply with the landscape's general structure;
- To exploit the territory's structural elements, such as administrative boundaries and their linear infrastructure (roads, electric lines, railways, etc.), as well as interfaces among the different land use types, to minimize anticipated impacts, limit the new right-of-way and foster visual integration of the line. In addition, the existence of roads offers real advantages for the construction and maintenance of the lines;
- To avoid visually highly exposed sections, whether on mountains summits or on exposed hillsides;
- To surround villages and areas where there is a concentration of households that are less compatible with the presence of electrical infrastructure and that would require to move a lot of people and high costs for compensations ;
- To avoid sensitive areas (natural reserves, wetlands, flood-prone areas, reforestation areas, industrial crops, etc.) and to use rather sections with lesser sensitivity likely to host the line with a minimum anticipated impacts;
- To avoid sections with rugged landform and steep slopes where access is more difficult for site machinery and where erosion risks are higher and can threaten the safety of the network.

A local optimization of the layout was also carried out during the field study, which helps to avoid or surround some of the most sensitive or binding elements on the crossed territory.

III.3 Power line

The width of the ROW must be at the maximum 25 meters for 110 kV lines. The design was determined by the extreme sag of connectors due to maximum wind effect as well as the environmental limitations such as audible sounds, electric field and radio and TV interferences.

The complete clearance of the ROW where the line crosses forested areas must be limited to a strip of 5 to 10 meters of width along the corridor in order to allow the stringing of conductors. Out of that strip, but within the ROW, all the vegetation higher than 4 to 5 meters must be cleared including trees with potential threat outside the ROW. Moreover, when the final positioning of towers is well done, it is a factor that may even reduce the need for clearing. Notwithstanding what is previously stated, crops that do not exceed 4 to 5 meters, particularly banana trees, will be authorized as well as livestock grazing or other compatible activities. That prescription will be maintained all along the operational life of the line.

Despite that, such an approach of maintenance aspects may be different from the methods in force among the operators, the experience of other projects in the region and internationally has shown that by engaging local communities present along the line for maintenance and surveillance of the line, those requirements regarding the line can be respected. That approach has also appeared to be efficient in order to reduce theft of metallic bracing and tower ground materials in addition to reducing maintenance costs related to vegetation control in the ROW. Such kind of agreement helps the users to maintain their activities (e.g. agriculture, livestock, plantations, etc.) on the condition that they do not interfere with the network operation.

The land acquisition will be limited to towers and substations locations. Since agriculture is based on one plantation and one manual harvest a year, the production loss will be small. Despite the fact that the area of tower base may reach 100 m² (10m x 10m), under normal circumstances, the lost area is limited to four concrete legs of the base, that is, in total 6.25 m² (2.5 m X 2.5 m). On soils with lower bearing capacity, each base can be between 0.5 and 1.0 m larger. Generally, soils are excavated on a depth of 3.5 m maximum.

Storage space for building materials and equipment will be used along the ROW. In addition, access roads will have to be possibly constructed by the Contractor in charge of construction works for the lines. The location and the length of such roads being no known for the time being, only general impacts related to them are described here

III.4 Line characteristics

For the 110 kV lines, the feasibility study proposes the following technical design:

Table 8: Line characteristics

Description	Unit	Value/Parameters
Tower type: Terminal tower type MAT+0		Tension medium angle tower
Line angle	Degree	150^0 - 165^0
Structural Steel according to Standard EN 1005	quality	S235/S355
Section of phase conductor	mm^2	ACSR 240/40
Horizontal Tension per phase ACSR 240/40 conductor at 0°C	daN	2500
Type and section of earth wire OPGW 97-AL3/48-A20SA,24G.652	mm^2	144.8
Horizontal tension foreseen of earth wire at 0°C (OPGW)	daN	1800
Number of phase conductors	Pce	3

Description	Unit	Value/Parameters
Number of earth wire OPGW conductor	Pce	1
Rated voltage of the line Phase-Phase	kV	110
Minimum electrical clearance phase -phase	mm	1200
Minimum electrical clearance phase -earth/tower	mm	1200
Electrical clearance distance phase to phase vertical arrangement in mid-span	mm	4000
Electrical clearance distance phase to earth wire OPGW in mid-span	mm	2500
Spans to be considered for tower calculation		
Line span	m	350
Wind span	m	350
Minimum height dimensions of the tower & foundation type		
Tower arrangement: Two (2) lowest cross-arms at the same level		Vertical arrangement
Total height to top above ground (earth wire point)	m	25.75
Total height to lowest cross arms above ground (conductor 1+2) attachment point)	m	17.25
Total height to highest cross arm above ground (conductor 3 attachment point)	m	21.75
Type of foundation (metallic grillage filled with at least 1600 daN/m3 density soil compacted to a minimum of 2,5 bars) in normal areas without water to be considered where soil bearing capacity is min.3 bars	set	Static calculation
Type of foundation in swampy area with water: steel reinforced concrete foundation type flat footing, class C25 to be considered where soil bearing capacity is approx.0,5 bar	m^3	55

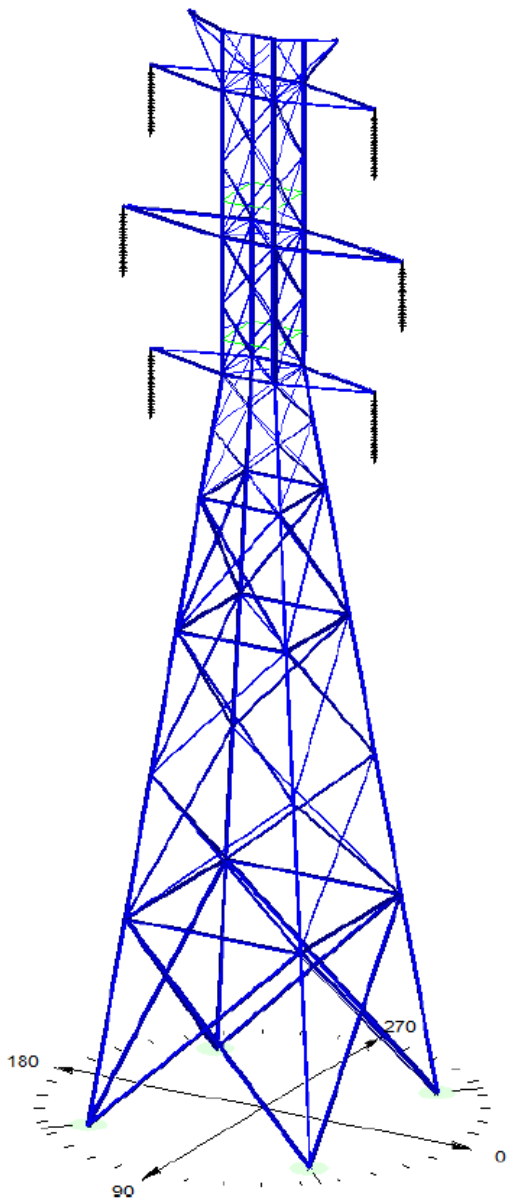

Figure 1: Schematic diagram of 110kV double circuit tower

III.5 Substation characteristics

For the 110 kV Substations, the feasibility study proposes the following technical design:

- General Provisions; (
- Provisions relating to electrical equipment;
- Directive for the construction of new HV / MV substations;
- Civil Engineering of substations;
- Emergency Diesel Groups;
- Optical fiber equipment;
- Earthing resistors, if applicable;
- Power Transformers;

- (Measurement Transformers;
- MV surge arresters;
- MV circuit breakers;
- Sectioning equipment;
- MV substations;
- Distribution of AC auxiliaries;
- Distribution of DC auxiliaries;
- Metal Works and Miscellaneous Supplies;
- Lighting and Power Outlets; (
- earthing system;
- Cables;
- Control, Control and Measurement Equipment;
- counting and protection equipment;
- Radio, Telecom, Power line and Fiber Optic equipment.

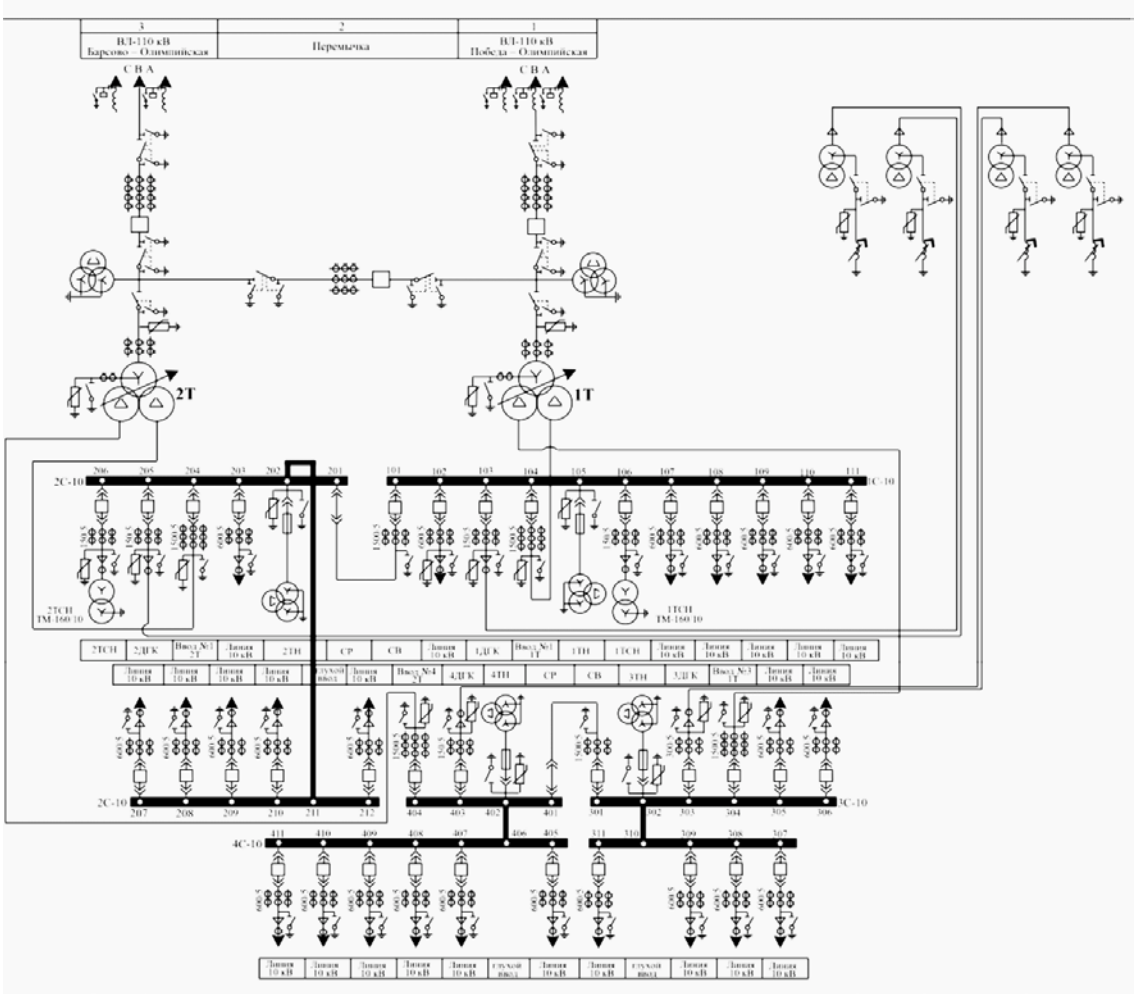

Figure 2: Schematic diagram of 110kV double circuit

III.6 Operation and maintenance

a) Right-of-way

The transmission line requires clearing a permanent ROW. Its width generally is 25 m wide.

Trees along the ROW must also be cleared. The width of that clearing operation is determined by the needed safety margin for a conductor moved at 45° from the vertical line should not cause short-circuit with the vegetation. The vegetation's annual growth will have to be considered during the assessment of the average size of the vegetation in the ROW.

The regular maintenance of the ROW will be done in order to maintain clearance as described above, among towers, conductors and all the vegetation or structures. An access road of 5 m width will also be maintained where necessary. Those maintenance operations will normally take place twice a year, but may vary according to local conditions and the contractors' planning.

b) Substations

Just as for the line, a maintenance program for substations is required. It has to provide for the regular replacement of coolants and lubricants of transformers.
REG has indicated that they would use no more transformers containing PCBs because of their toxicity against the environment and human beings.

III.7 Preliminary schedule and project costs

Based on the consultant experience in similar projects, the construction should start after the contract signing that follows an international invitation to tender. Preconstruction activities include a geological investigation, a detailed survey of the line and the substations, as well as an update of the inventory of property of the People Affected by the Project (PAP), the payment of compensations and reinstallation. The next step is for the client to mobilise the fund based on this feasibility study findings. Then it is expected to take at least one year to start construction activities (Site preparation, construction of storage facilities and other temporary buildings, the establishment of water and power supply systems as well as communication facilities on construction sites).

The construction will start with tower foundations followed by their erection and conductors installation. The construction is expected to spread over 24 to 28 months after contract award to contractors and consultants.

The project total cost established in April 2020 including a provision of 10% for contingencies is 103,060,680 USD being distributed as follows:

Table 9: Total all projects Investment cost in USD

NO	Project Name	Investment cost in USD
1	Kayonza - Kirehe 110 KV line	11,638,000
	110 KV substations(Upgare and New)	11,900,000
2	Nyamagabe-Huye-Gisagara line	8,304,840
	110 KV Substations (Upgare and new)	11,900,000
3	Bugesera industrial park substation	9,600,000
	Bugesera IP-BIA Cut-in Cut-out	3,888,000
	Bugesera International Airport substations	20,300,000

4	Nyagatare-Gabiro 110 KV line	4,869,840
	Nyagatare-Gabiro 110 KV substation	11,900,000
5	Rulindo-gicumbi line	360,000
	Rulindo-gicumbi Substation	8,400,000
	TOTAL	103,060,680

Chapter IV: Description of the Current Project Environment (Baseline State)

The description of the Current Project Environment or Baseline State provides the context from which to consider the environmental and social impacts of the proposed project. The baseline characteristics described include both environmental (climate, topography, hydrology, geology, soils, biodiversity, ecosystems, etc.) and social indicators (income, poverty, gender issues, literacy, health care, etc). The baseline assessment is presented for each of the project area.

IV.1. Environmental Baseline for Kirehe – Kayonza Power Line and Substation

IV.1.1. Biophysical Baseline for Kirehe – Kayonza Power Line and Substation

a) Climate and Air Quality

This project site is located in the south eastern part of the country. The area enjoys generally the country's climate pattern, i.e. an equatorial climate tempered by altitude, characterized by mild, stable temperatures and moderate precipitations according to a cycle of four seasons with two dry seasons (January – February / June – August) and two rainy seasons (March – May / September – December).

The site is part of the eastern lowlands, characterized by high temperature and erratic rains. The annual rainfall averages approximately 1,250 mm, with an temperature varying between 18ºC and 26ºC. Air quality across the Districts will be generally good outside of more settled areas. In rural homesteads, the use of wood and charcoal for cooking and heating results in proven breathing and other health issues, at the household level. There are no significant industries or mining activities that could result in poor air quality along the proposed route. Air pollution seems to occur for short periods, on a daily basis, in congested areas, resulting predominantly from exhaust fumes (being the primary source of pollution) and the morning smog caused by domestic fires.

b) Topography and Hydrology

The eastern lowlands characterized by a succession of basins separated by extensions of the Central Plateau. The soft, often flattened hills whose altitude are between 1,200 and 1,500m and belong to the Buganza (Ngoma District) and Migongo (Kirehe District) Plateaus. Watersheds of all the study areas are drained by affluents of the Nyabarongo- Akagera system that belongs to the Nile Basin.

c) Geology and Soils

This rock substrate of this region belongs to the Karagwe – Ankole system, 1,400 – 1,000 million years old. It is made of clay stones, shales and phyllites, limestones and quartzites. Granites are less frequent but form the substrate of the Mutara, middle Akagera and Bugesera basins. Some late pterozoic intrusive rocks produce small inselbergs. Remnant of the extensive lateritic formations dating from the Tertiary cover large areas of the eastern plateaus.

Kayonza[2] district has very fertile soils almost in all its sectors. Most of the soils are loamy and few others are sandy with loam mixture. In some boggy areas, clay soil may be found. In Kirehe district soil type is a mixture of little sandy –clay soil.

d) Flora (Vegetation)

The natural vegetation in the project site is wood / forest savanna type, with predominance of acacia trees. However this natural vegetation which was historically very dense and covering the flatten eastern hills, is now tending to disappear completely, due to human pressure for agricultural fields, and to be replaced by crop fields and forest plantations, by the District and private individuals. Very little remaining natural vegetation cover of conservation importance remains, due to extensive human activities. Generally, there is no important conservation areas or species recorded along the proposed power line route

e) Fauna (Wildlife)

Despite the strong anthropization of the environment, wildlife still exist in along the route of the power lines, as indicated in the table below.

Table 10: Wildlife encountered on the Kayonza – Kirehe power line

District	Observed fauna types in the project area			
	Mammal	**Bird**	**Amphibian/Reptile**	**Fish**
Kayonza – Kirehe				
Kirehe	Mice, Jackals, Bat...	Black Eagles, Grey-headed Sparrow, Village Indigobird, Chubb's Cisticola, Tropical Boubou, Tambourine Dove, African Paradise……..	Anoline Lizard, chameleon, gecko...	No fish
Ngoma	Mice, Jackals, Bats	Black Eagles, Grey-headed Sparrow, Village Indigobird, , Tropical Boubou, Tambourine Dove, African Paradise, Black-headed Heron ……..	chameleon, gecko...	No fish
Kayonza	Mice, Jackals, Bat, Cow, Dogs, Goats	Black-headed Heron, Narrow-billed antwren, Black Eagles, Grey-headed Sparrow, Village Indigobird, Tropical Boubou, Tambourine Dove, African paradise, Green Wood-hoopoe,	Chameleon, gecko...	No fish

The encountered wildlife species along the proposed power line are common species, no species of particular conservation status.

[2] DDP Kayonza, 2018

f) Critical Habitats:

The wetland systems traversed by the proposed distribution line project, range from dense continuous Papyrus to mixed stands with *Typha, Phragmites*, and *Miscanthedium* (refer to Appendix E for species lists). The fringes of the wetlands can also host shrubs, trees and riparian thicket, an essential component of the wetland ecosystem, providing habitat for various species of birds. The overall observation is that except for the relatively intact large wetland or swamp areas, other areas of natural vegetation have largely been transformed by human settlement and farming.

The list and coordinates of the swamps traversed by the Kirehe – Kayonza Power Line is provided in the following table:

Table 11: List and coordinates of water bodies traversed by the Kayonza – Kirehe Power Line

Districts	Sectors	Water Surface/Swamps	Characteristics	Geographical Coordinates
Kayonza – Kirehe				
Kirehe	Kirehe	Nyakagera	Marshland	-2.256993, 30.659680
	Kirehe	Gacencero	Marshland	-2.229428, 30.641466
Between Kirehe and Ngoma	Mushiri and Rukira	Karuruma	Stream	-2.186672, 30.621008
Between Ngoma and Kayonza	Rukira and Kabare	Nyarwogo	stream	-2.123321, 30.632892
Kayonza	Kabare	Kanyabutimba	marshland	-2.071732, 30.623843

g) Land Use in project area

A total of 58.22 ha will be affected by the 50km long Kayonza – Kirehe Power Line. These are currently used for agricultural purposes, of different crop types as illustrated in the following table:

Table 12: crops fields crossed by power Kayonza – Kirehe power line

District	Type of crop	Extent (Ha)	Percentage of on entire ROW	Total (Ha)
Rwinkwavu – Kirehe				
Kirehe	Banana	2.8750	35.9375	21.0750
	Forest	3	51.6129032	
	Coffee	1.1500	40.6001765	
	Others	14.0500	33.7943476	
Ngoma	Banana	3.6250	45.3125	18.6500
	Forest	2.1250	36.5591398	
	Coffee	0.9500	33.5392763	
	Others	11.9500	28.7432351	

Kayonza	Banana	1.5000	18.75	18.4950
	Forest	0.6875	11.7773019	
	Coffee	0.7325	25.8605472	
	Others	15.5750	37.4624173	
	Mixed Crops (beans, maize, sorghums)	6.325 ha	31.4%	
	Banana plantation	1.8625 ha	9,2%	
	Natural trees, glasses and eucalyptus forest	9.3375 ha	46.3%	
	Coffee plantation	0.6125 ha	3%	
	Cassava and or sweet potatoes plantation	2 ha	9,9%	
Total				**58.2200**

IV.1.2. Social Baseline for Kirehe – Kayonza Power Line and Substation

The information for the social baseline has been sourced from the Kirehe, Ngoma and Kayonza District Development Plans, other available reports and directly from local stakeholders.
The social information from these reports and data from the site has been assimilated and presented as a baseline for Kirehe – Kayonza Power Line project.

a) Administrative Boundaries (Districts / Sectors / Cells crossed by the line)

The 50km proposed route of the power crosses 3 Districts, 4 Sectors, 6 Cells, and 19 Villages in the Eastern Province as detailed in Table below:

Table 13: Administrative entities crossed by the Kirehe – Kayonza Power Line

Province	District	Sector	Cell	Villages
Kirehe – Kayonza Power Line				
Eastern Province	Kirehe	Kirehe	Nyabikokora	Rutonde
				Gatwa
				Rugenge
				Kamasaro
		Mushikiri	Bisagara	Umuyange
				Umutuzo
				Bingaro
	Ngoma	Rukira	Nyinya	Rwamukobwa
				Cyabayagara
			Kibatsi	Rubagabaga
				Korandebe
				Agatare
	Kayonza	Kabare	Rubimba	Buhabwa
				Nyarusange
				Rwamushoma
				Kabarungu
				Kabeza

Province	District	Sector	Cell	Villages
			Gitara	Gahombya
				Rugunga

b) Population

Kirehe District extends over a total area of 1,118.5 Km2 with about 164,012 male and 176,971 female inhabitants equaling to 340,983 of its total population according to the newly provisional results released by the National Institute of Statistics of Rwanda (NISR). The population size of Kayonza District ranges to 346, 751 people, living in 12 sectors, 50 cells and 421 villages (mudugudu). The mean population density is 179/km^2. On habitat the EICV3 indicates that 94.5% people live in Imidugudu compared to 37.5% of the National average.

c) Economic activities

The economy of the district is mostly dependent on agriculture and livestock, where fertile soil are exploited and give satisfactory production for food crops like banana, maize, beans, soya beans cassava and marshlands suitable for rice growing then fruits like pineapples oranges, mangoes etc. These crops are on a consolidated land of 64,500 Ha of land. Banana plantation is mostly cultivated in the areas of Mushikiri, Gatore, Kirehe and Musaza where it covers 11,500 Ha of land in the district**.** According to the EICV3, Kirehe district cultivate maize on a consolidated land that covers almost 25,000 Ha in the swampy areas of the Akagera region in the sectors Kigarama, Nyamugari, Mahama, Mpanga and Nasho.

Kirehe District has potential for tourism, provided that the tourism sites as developed and promoted, these are: is promoted where there are sites that are likely to be developed like Nyarubuye Mushikiri, Rusumo falls at River Akagera at the border with Tanzania.

Fishing activities on exsting lakes (Rwampanga, Cyambwe, Nyabugongwe) is also another potential for the District economy. These are restocked and produce up to 19,758.6 tons of fish annually and generating a steady income for the people of the area.

With regard to mining activities, the District of Kayonza has wolfram, cassiterite and coltan deposits in Rwinkwavu, Murundi, Ruramira, Mwili, Rukara, Ndego and Kabarondo sectors. Previously the mining was done only at Rwinkwavu (Rwinkwavu Wolfram Company) but now the mining activities extended to all mining potential areas whereby around 15 companies are involved in mining process. There is also construction resources such as gravel stones, rocks and sand for increased construction industry.

d) Road network

The district has a very good network of roads that connect it to other districts and also agriculture production areas, 39 km of tarmac road along Kayonza – Ngoma - Kirehe - Rusumo high way to be well maintained and rehabilitated. Moreover, the District has several roads connecting all the sectors in the district for easy transportation of agricultural products across the zones and areas. However, due to the effect of erosion and poor maintenance, many of these roads are in a deteriorating state and require immediate rehabilitation. The district has

some bridges of which most of them need to be repaired because they play a big role in facilitating different sectors to be able to interact socially as well as economically.

e) Access to health care

The high number of people living with HIV/AIDS that augment the number of social protection demands but 67%% has access to safe drinking water, 90% have medical insurance cover under *Mutuelle de Santé* and under five year mortality rate is at 126 per 1,000 born. Family planning is at 42.8%. The use of modern family planning methods have increased to 37%; Fertility rate at 4.7%, chronic malnutrition is at 50.7%, acute malnutrition currently is at 1%, the population is served by a hospital (Kirehe Hospital), 15 health centers and 12 viable maternity wards in each health posts of Bukora, Nasho, Kabuye, Musaza and Gahara.

f) Energy sources

Firewood is the major source of energy for the population. It is used so much in such a way that it causes a problem of environmental degradation because so many trees are cut for fire energy. As for other energy sources, like electricity, it is only available in some trading centers and major towns. Wind energy and biogas are not yet available but solar energy exists in certain places. 1.6% Households with electricity as a source of lighting compared to 63% of the national verage. There is crucial need to increase rural accessibility to energy by Supplying power and connecting all Households in trading centers, installation of lightening conductors in all public institution buildings like schools, health centers, markets and other public buildings. Reinforce solar energy and biogas systems, Promote the use of improved cooking stoves (Rondereza).

g) Education and literacy

There are 267 classrooms for the 9 YBE and 12 YBE. 14% of adults have been trained in adult literacy, school dropout has been reduced to 10% and the target is 1%, teacher/ pupil ratio for primary is 60. There are 48 nursery schools and 5 baby care schools, 1 TVET and 1VTC where 1,412 teachers have been trained in English language. 2,830 pupils have received a laptop under one laptop per child program in the district.

h) Access to clean water

The majority of the population (67%) has access to improved water. The average covered distance by the person in Kirehe district to be able to get access to water is 800meters. Rate of public areas and households access to clean water is at 67.6% compared to 71% of the national average.

i) Poverty and vulnerability analysis

Poverty rate is at 47.9% compared to the National average of 44.9%, Extreme poverty rate is at 25.6% compared to 24.1% of the National average, GIRINKA program has distributed 6000 cows to vulnerable families, EICV3 also reveals that the District has 8.5% of the wage farm employed people compared to 9.9 of the National average, Wage non-farm is at 7.0% to 16.9%.

j) Gender Analysis

Measures are undertaken to strengthen women and men's capacity in cooperative management and farming techniques. Gender is widely acknowledged that considerations related to gender issues and women's participation influence the success and sustainability in all projects. In Rwanda, women are major contributors to the economy especially in agriculture, both through their remunerative work on farms and through the unpaid work they traditionally render at home and in the community. Yet in some instances, they are excluded from access to resources, essential services, and decision-making.

IV.2. Environmental Baseline for Nyamagabe – Gisagara Power Line and Substations

This power line project comprises 40.71 kilometers 110kV line and 2 substations in Gisagara and Huye area. The project crosses three districts respectively Gisagara, Huye and Nyamagabe in the Southern Province

IV.2.1. Biophysical Baseline for Nyamagabe – Gisagara Power Line and Substation

a. Climate and Air Quality

This project site is located in the southern part of the country. The area enjoys generally the country's climate pattern, i.e. an equatorial climate tempered by altitude, characterized by medium temperature according to a cycle of four seasons with two dry seasons (January – February / June – August) and two rainy seasons (March – May / September – December). The annual rainfall varies from 1300 to 1450 mm with average temperature of 18°C.

The site is part of the eastern slopes of the Congo Nile Divide towards the southern part of the Central Plateau, with altitudes ranging between 1,500 and 2,000m.

Air quality across the Districts will be generally good outside of more settled areas. In rural homesteads, the use of wood and charcoal for cooking and heating results in proven breathing and other health issues, at the household level. There are no significant industries or mining activities that could result in poor air quality along the proposed route. Air pollution seems to occur for short periods, on a daily basis, in congested areas, resulting predominantly from exhaust fumes (being the primary source of pollution) and the morning smog caused by domestic fires.

b. Topography and Hydrology

The eastern slopes of the Congo Nile Divide – encompassing Nyamagabe District - are less abrupt together with the Central Plateau cover most of the Center of the Country. The relief is characterized by jagged and irregular slopes ranging from 60° to 120° making soils susceptible to soil erosion and degradation. A complex of network of river valleys is fragmenting this plateau into "thousand hills" with convex slopes and rounded summits. Watersheds of all the study areas are drained by affluents of the Nyabarongo- Akagera system that belongs to the Nile Basin. Nyamagabe district is particularly endowed with low altitude wetlands of Akanyaru, Nyabarongo and Akagera.

c. Geology and Soils

Schematically, the rock substrate of this part belongs to the ubendian system 1,800 to 1,700 million years old. Soils on the dorsal granite of the Congo Nile Divide are the not fertile as they are poor in humous content, while the Central plateau soils (the koalisol type) are better and fertile when the erosion has not impacted it and their humus layer has been conserved. Huye[3] soils' depths depend on the situation on the hill, the best soils are found in swamps. The Nyamagabe[4] District main soil type is Histosols.

d. Flora (Vegetation)

Natural vegetation on the line route has disappeared due to agricultural pressure and has been replaced by man- made vegetation dominated by crop fields. The largest part of the land is under cultivation for various crops, such as bananas, beans, sorghum, irish potatoes and cassava. However, there are certain patches of reforested land dominated in large part by eucalyptus and grevillia.

e. Fauna (Wildlife)

The encountered wildlife along the line route are shown in the table below

Table 14: encountered wildlife along the Nyamagabe – Gisagara Power Line

District	Observed fauna types in the project area			
	Mammal	Bird	Amphibian/Reptile	Fish
Nyamagabe – Gisagara				
NYAMAGABE	White faced monkeys, Mice, Jackals, Bat,	Grey-headed sparrow, speckled mousebird, Ducks (wild water geese, not domestic); Small birds of prey, doves, crows, etc.	Anoline Lizard, chameleon, gecko...	No fishes
HUYE	White faced monkeys, Mice, Jackals, Bat,	Grey-headed sparrow, speckled mousebird, Small birds of prey, doves, crows, etc.	Snakes, chameleon, gecko...	No fishes
GISAGARA	White faced monkeys, Mice, Jackals,	Grey-headed sparrow, speckled mousebird, Small birds of prey, doves, crows, Wood-hoopoe, etc.	Chameleon, gecko...	No fishes

The encountered wildlife species along the proposed power line are common species, no species of particular conservation status.

[3] DDP Huye ,2018
[4] DDP Nyamagabe, 2018

f. Critical Habitats

The wetland systems traversed by the proposed distribution line project consists in small waterbodies. The overall observation is that fringes of these water bodies have largely been transformed by human settlement and farming.
The list and coordinates of the swamps traversed by the Kirehe – Kayonza Power Line is provided in the following table

Table 15: List and coordinates of water bodies traversed by the Kayonza – Kirehe Power Line

Districts	Sectors	Water Surface/Swamps	Characteristics	Geographical Coordinates
Nyamagabe – Gisagara Power Line				
Nyamagabe	Kamegeri	Mwogo	Stream (Between Nyamagabe-Huye Districts)	UTM 35M , 787542E, 9726106N
Huye	Maraba	Mwogo	Marshaland	UTM 35M, 786889E, 9720507N
Nyamagabe	Gasaka	Nkungu	Marshaland	UTM 35M, 788348E, 9724233N
Nyamagabe	Gasaka-Kamegeri	Nkungu	Stream	UTM 35M, 785402E, 9725290N
Huye	Mbazi	Mbazi	Marshland	-2.611822 Lat., 29.763052 Long.

g. Land use in project area

A total of 112.16ha will be affected by the 40.71km long Nyamagabe – Gisagara Power Line. These are currently used for agricultural purposes, of different crop types as illustrated in the following table:
Table 16: areas crossed by power Nyamagabe – Gisagara Power Line

District	Type of Crop	Extent (Ha)	Percentage of on entire ROW	Total (Ha)
Nyamagabe– Gisagara				
Nyamagabe	Banana	3.00	2.61	42.64
	Forest	14.87	12.93	
	Soja+ Beans +Sorghum	9.86	8.58	
	Coffee	11.16	9.70	
	Others	3.75	3.26	
Huye	Banana	9.75	8.48	47.70
	Forest	6.56	5.71	
	Soja+ Beans +Sorghum	19.58	17.02	
	Coffee	7.13	6.20	
	Others	4.69	4.08	
GISAGARA	Banana	4.50	3.91	21.83

	Forest	5.44	4.73	
	Soja+ Beans +Sorghum	6.56	5.71	
	Coffee	3.92	3.41	
	Others	1.41	1.22	
Sub- Total				**112.16**

IV.2.2. Social Baseline for Nyamagabe – Gisagara Power Line and Substation

The information for the social baseline has been sourced from the Nyamagabe, Huye and Gisagara District Development Plans, other available reports and directly from local stakeholders.
The social information from these reports and data from the site has been assimilated and presented as a baseline for Nyamagabe – Gisagara Power Line project.

a. Administrative Boundaries (Districts / Sectors / Cells crossed by the line)

The 40.71km proposed route of the power line crosses 3 Districts, 8 Sectors, 13 Cells, and 21 Villages in the Southern Province as detailed in Table…

Table 17: Administrative entities crossed by the Nyamagabe – Gisagara Power Line

Province	District	Sector	Cell	Village
Nyamagabe – Huye – Gisagara				
Southern Province	Nyamagabe	Kamegeri	Cyizi	Gakomeye
				Cyizi
			BWAMA	Kigarama
		Gasaka	Nyabivumu	Raro
			REMERA	Nyamivumba
			GASAKA	Nzega
		Kibilizi	Uwindekezi	Mugote
	Huye	Maraba	Gasumba	Taba
				Gitabura
		Huye	Sovu	Gasongati
				Gikombe
				Ngobagoba
				Rwezamenyo
		Mbazi	Kabuga	Gakombe
			RUBONA	Gatobotobo
	Gisagara	Save	Rwanza	Bitabire
				Cyezuburo
				Kigarama
		Kibilizi	Duwani	Buhoro
				Karambo
			RUTURO	Agatongati

b. Population

Nyamagabe District has a population of 342,112 persons. 180,472 (53%) of them are women and 161640 (47%) are men. The population density is 314/km2 (2012 Population and Housing Census, Provision Results). In Nyamagabe District 70, 4% of young populations aged 14 to 35 years who are in economically active are women while men economically active in the same age are only 68, 7%. This has a positive impact on women incomes.

c. Economic activities

According to the EICV3 District profile, the majority of the population (78%) of the total population aged above 16 years lives on agriculture. Crops by order of importance include beans, Irish potatoes; wheat, bananas, sorghum, cassava, peas, maize and soya. Serious problems facing food production in the District are linked to poor soil fertility due to soil acidity and non modernized agriculture. Tea and coffee are the major cash crops grown in Nyamagabe District. Tea is grown mainly in the western part of the District close to Nyungwe National Park (Nkomane, Gatare, Buruhukiro, Uwinkingi Kitabi) whereas coffee is grown in almost throughout the entire District. There exists 1 tea factory operational at Kitabi and 6 coffee washing stations (BUFCOFFEE at Rususa and Remera, MIG at Kibumbwe and Ngoma, KOAKAKA at Muganza, SLD Kigeme). The District counts 6 handicraft / small scale industries / cooperatives engaged in activities such as basket wearing and pottery.
Tourism is also one of the activity sectors which generate revenue in areas frequented by tourists. In Nyamagabe District, Nyungwe National Park is a tourist attraction with its fauna and flora rich in different animal and plant species. Apart from the park, other activities attracting tourists include organized handcrafts trade, cultural troupes, etc. which must be developed to attract and make tourists stay longer in the region. The District counts 2 Hotels and 3 Motels where tourists and visitors from Nyungwe National park, Kunyu and other touristic areas can relax. Handcraft activities including basket wearing and pottery and Nyamagabe District counts 6 handicraft cooperatives.

d. Road network

Nyamagabe District is traversed by a single tarmac road HUYE-NYAMAGABE-RUZISI. 439 Km of murrum roads need regular maintenance due to district relief which is characterized by land slopes. Nyamagabe District walks less than 20 minutes to get to the nearest public stage against 24.2% at national level. About 10.1% of the Nyamagabe population have to walk between 20 and 59 minutes to get to the nearest public stage against 26.4% at national level. However, about 41.85% of Nyamagabe population have to walk between one and two hours to get to the nearest transport stage against 25.55% at national level, 41.4% of Nyamagabe population walks more than two hours to get to the nearest public stage against 23.7% at the nation level. In general this considerable walking time used by the Nyamagabe population to get to the nearest public stage will be reduced by constructing additional paved roads , rehabilitate the existing ones and constructing two new car park.

e. Access to health care

Regarding accessibility to health services Nyamagabe District has 25 health facilities (2 hospitals, 1 District Pharmacy, 17 health centers, 2 Health Post and 3 Community Posts)..

f. Energy sources

In Nyamagabe District, only 2.7% of households have access to electricity. The majority of the population use different forms of electricity, including:

- For cooking, 96, 8% of households use firewood, 2.6% of households use charcoal, 0.4% of HH use Crop Waste, 0.2% use other primary source of cooking fuel.(EICV3, 2010- 2011).
- For lighting, 7.6% of households use oil lamp, 24.9% use firewood, 9.1% of households use candle, 19, 6% of households use lantern, 30, 6% of households use battery, 5.5% of HH use other primary fuel used for lighting.

g. Education and literacy

The District counts 55 nursery schools, 103 Primary schools, 46 Secondary schools with 1194 classrooms and 5 Vocational Training Centers (VTCs). The average literacy rate is 63.2% in Nyamagabe District and according to the EICV 3 is ranked among the last four districts with the lowest levels of literacy rate among population aged 15 and above. Different strategies have been to overcome this challenge for the five next years. in Nyamagabe District the net primary school enrolment rate (children 7 to 12 years old) is lower than the national enrolment rate, but female attends better primary school than male. For the tranche between 15 and 24 years old, the literacy rate is higher than the rate at national level. The effort is needed for computer literacy rate for persons 15 years and older whereby the percentage is only against 5.3% for national level.

h. Access to clean water

Nyamagabe District is among several zones in the country with sufficient water sources which can potentially satisfy the demand of the population water needs if tapped. However, near 32% of the population use dirty water from streams, dams, valleys or swamps. It is absolutely necessary to develop new sources and rehabilitate existing ones.

i. Poverty and vulnerability analysis

Huye and Nyamagabe Districts has a number of vulnerable persons. A large number of these vulnerable persons have neither shelter nor land for cultivation. Their housing is inappropriate and children access to education and health care is very limited.

j. Gender Analysis

Gender decision making at sector level s promoted in Nyamagabe District whereby in some sectors women and men are involved in decision making, while in others, the decision making doesn't involve women. The District strategy for the five next years is to increase the number of men and women in decision making at all levels.

IV.3. Environmental Baseline for Gabiro – Nyagatare Power Line and Substation

The proposed power line comprises 26.7 kilometers 110kV line and 1 substation in Gatsibo area. The project crosses 2 districts respectively Gatsibo and Nyagatare of the Eastern Province.

IV.3.1. Biophysical Baseline for Gabiro – Nyagatare Power Line and Substation

a. Climate and Air Quality

This project site is located in the north eastern part of the country. The area enjoys generally the country's climate pattern, i.e. an equatorial climate tempered by altitude, characterized by mild, stable temperatures and moderate precipitations according to a cycle of four seasons with two dry seasons (January – February / June – August) and two rainy seasons (March – May / September – December).

The site is part of the eastern lowlands, characterized by high temperature and erratic rains. The annual rainfall averages approximately 1,250 mm, with an average temperature of 20oC. Air quality across the Districts will be generally good outside of more settled areas. In rural homesteads, the use of wood and charcoal for cooking and heating results in proven breathing and other health issues, at the household level. There are no significant industries or mining activities that could result in poor air quality along the proposed route. Air pollution seems to occur for short periods, on a daily basis, in congested areas, resulting predominantly from exhaust fumes (being the primary source of pollution) and the morning smog caused by domestic fires.

b. Topography and Hydrology

The eastern lowlands characterized by a succession of basins separated by extensions of the Central Plateau. The study area belongs to the Umutara, soft dominated by soft and flattened hills whose altitude are between 1,200 and 1,500m. Watersheds of all the study areas are drained by affluents of the Nyabarongo- Akagera system that belongs to the Nile Basin.

c. Geology and Soils

The rock substrate in this region belongs to the Karagwe – Ankole system, 1,400 – 1,000 million years old. It is made of clay stones, shales and phyllites, limestones and quartzites. Granites are less frequent but form the substrate of the Umutara, middle Akagera and Bugesera basins. Some late pterozoic intrusive rocks produce small inselbergs. Remnant of the extensive lateritic formations dating from the Tertiary cover large areas of the eastern plateaus.

Gatsibo[5] District is characterized by an abundance of the humus-bearing grounds ferralisols one originating laterite of the deterioration of the shales and phyllites, accumulation of the collisions in the valleys dry Martini. The ground of granite origin cuts has texture with little red clay especially in the South – West of the District. The termite mounds are covers the biggest part of the District. Nyagatare[6] District is characterised by an abundance of humus bearing soils and ferralisols. The later are the ones that transform into laterite from the deterioration of the shales and phyllites and accumulation of the collisions in the dry valleys. The granite soil has a texture with little red clay especially in the South-West part of the District.

[5] DDP Gatsibo,2018
[6] DDP Nyagatare, 2018

d. Flora (Vegetation)

The natural vegetation of the project area is characterized by a forest savannah. The hills are covered by short grasses as well as small trees and shrubs. However this vegetation has been heavily transformed to leave place to crops fild and forest plantations Eucalyptus and of Pinus.

e. Fauna (Wildlife)

Part of the project area (specifically in Gatsibo District) has historically been a portion of former hunting domain adjunct to the Akagera National Park. In this regards, a number of wildlife species are still visible, including diversified birds notably the rapacious ones are sparrow hawks, the owls, the sparrows, the guinea fowls, the partridges, the heroes, the ibis, the crows, the prick beef, etc. Also the Hares, the wild boars, the monkeys and other rodents live in the hills where there are small natural shrubs. The hippopotamus are met in the river Umuvumba and in the lake Muhazi. The crocodiles exist also in certain valleys dams as to Rwimbogo. The antelopes, the buffalo, other ruminating animals occupying the Akagera National Park.

f. Critical Ecosystem

The proposed power line crosses a stream at Karangazi

Table 18: List and coordinates of water bodies traversed by the Gabiro – Nyagatare Power Line

Districts	Sectors	Water Surface/Swamps	Characteristics	Geographical Coordinates
Gabiro-Nyagatare				
Nyagatare	Karangazi	8m*25m=96m^2	Stream	Karangazi

g. Land Use in the project area

A total of 27.02ha will be affected by the 18km long Gabiro – Nyagatare Power Line. These are currently used for agricultural purposes, of different crop types as illustrated in the following table.

Table 19: areas crossed by power Nyamagabe – Gisagara Power Line

District	Type of Crop	Extent (Ha)	Percentage of on entire ROW	Total (Ha)
Gabiro-Nyagatare				
Nyagatare	Mixed Crops (beans, maize, sorghums)	13.6275 ha	50.4%	27,02 ha
	Banana plantation	2.64 ha	9.7%	
	Natural trees and glasses (known as firms for cows)	10.7525 ha	39.7%	
Sub Total				**27.02**

IV.3.2. Social Baseline for Gabiro – Nyagatare Power Line and Substation

The information for the social baseline has been sourced from the Gatsibo, and Nyagatare District Development Plans, other available reports and directly from local stakeholders.
The social information from these reports and data from the site has been assimilated and presented as a baseline for Gabiro – Nyagatare Power Line project.

a. Administrative Boundaries (Districts / Sectors / Cells crossed by the line)

The 26.7km proposed route of the power line crosses 2 Districts, 3 Sectors, 3 Cells, and 7 Villages in the Eastern Province as detailed in Table below:

Table 20: Administrative entities crossed by the Gabiro – Nyagatare Power Line

Province	District	Sector	Cell	Village
Gabiro-Nyagatare				
Eastern province	Gatsibo	Kabarore	Nyabikinki	Ngarama
	Nyagatare	Karangazi	Musenyi	Makomo
				Bugarama
				Gacungiro
				Kabeza
				Ruziranyenzi
		Nyagatare	Ryabega	Ryabega

b. Population

Based on the 2012 Population Census results, the total population in Nyagatare is 466,944 inhabitants of which 228, 610 are male(49%) and 238, 334are females (51%). The average density attains 243 inhabitants/km² which is by far lower than the national density figure of 321 inhabitants/km². The most populated sectors are Rwimiyaga and Karangazi which have 58,847 and 56,871inhabitants, respectively, while the less populated sectorsare Kiyombe and Rwempasha having respectively 17,061 and 19,328 inhabitants. Most people aged16 and above in Nyagatare are independent farmers (66.5%), followed by wage farmers (13.2%), wage non-farmers (7.2%).

c. Economic activities

Nyagatare District share to the national agricultural production is still low, despite the high potential. Some crops such as maize which is far above the national average with 35% against 18%, Sorghum (9%) above the national average of (1%), Rice (2%), slightly above the national average (1%) Groundnuts (3%) above the national average of 2%, Cassava (11%) above the national average of 9%, Fruits (1%) above the national average of 0% and finally vegetables (2%) above the national average of (0%). Agriculture offers agro-business opportunities through the commercialization of crops production. These opportunities are measured by the share of harvest sold (including households selling zero crops) which is 26.7% in Nyagatare District i.e. above national level (20.9%). In the district, the share of harvest sold for fruits and vegetables is lower (6.4%) than that of staple crops (13.6%).The development of the agriculture sector will help to eradicate hunger among the residents and

boost the consumption which has a multiplier effect of the general growth of the region. Over 80% of the labor force work in the agriculture sector contributing 25% to the GDP. Agro-processors are critical and need special attention at all layers of the economy, acting as large-scale buyers of farming products and engaging in significant value creation. MINICOM works with agro-processors across varied SMEs, including essential oils, pyrethrum, coffee, maize, wheat, macadamia, pineapple, passion fruit, tomatoes, sugar, honey, dairy, fish, animal feed, among others. Most of them have their selling points in some urban parts of Nyagatare District. In addition to crops, livestock is another important source of income and food for agricultural households. Regarding the livestock population of the District of Nyagatare, cattle (198,613) comes first, followed by goats (181,637), chicken (108,026), rabbits (19,427), sheep (17,902) and pigs (6,357)[7], as shown in the table below. Since there is a large cattle population available in the district, the expansion of milk production can be recommended. The Girinka Program (One Cow per Family) has increased the number of cows producing milk in Rwanda and especially in Nyagatare. There are 18 Milk Collection Centers located in nine sectors of Nyagatare District. However, only 12 are operational so far.

Mining in Nyagatare represents 0.1% of employment, whereas the national average is estimated at 1.0%. Nyagatare District has important deposits of Wolfram, Coltan and Cassiterite, big quarries consist of granites in Nyagatare Sectors and clay in Rwamanga, Balija and Nyagatare Sectors. However, research is required to determine how best to engage in mining in the District and to develop appropriate techniques and capacities. From April 2011 to April 2012, the total mining production in Nyagatare District was of 6,335kg amounting to 0.07% of the total national production which is estimated at 9,148,980 kg of minerals.

d. Road network

Nyagatare District consists of a rural area with a poorly developed road network. Inadequate roads raise transport costs, which limits the access to markets to sell and purchase goods, limits possibilities of off-farm jobs and makes it difficult to access educational and health facilities.

The basic infrastructure in the rural areas has to be improved to facilitate the co-relation between the rural sectors and the urban centers, especially with regards to trade and transfer of agricultural products.

e. Access to health care

95.5% of the population is covered by health insurance mechanisms[12], which is a high performance as compared to the national figure of 90.7% and the national target of 100% coverage. There are 20 health centers, two health posts, one prison dispensary and one district hospital in Nyagatare District. They all have access to water, internet and electricity. A previous assessment highlighted that some health centers will need extension or recruitment of health staff. It is also realistic to add that there are other private clinics that operate in some emerging cities which provide a support to the public. Here, private investors have to start investing in health facilities provision. With regards to the distance covered in order to reach health facilities, EICV3 indicated that the mean walking distance to a health centre in Nyagatare District is the same as the national level (60 minutes) and 48.3% of households walk for under one hour to reach a health centre.

f. Energy sources

The connection to electricity power counts for 11% of the district's households (10.8% countrywide) as the report produced by EWSA in June 2012 indicates. In 2011, the population which is located less than 20 minutes from all-weather road is estimated at 56%.

g. Education and literacy

The literacy rate is 67.5% in the District. This constitutes a challenge to the creation of off-farm employment and service-based activities like tourism. Adults' training programs shall be needed to bridge this gap.

The classroom/school ratio in Nyagatare District is 14/1 in primary schools and 9/1 in secondary schools. At national level these figures are respectively 11/1 and 9/1.The pupil/teacher ratio in Nyagatare District is 61/1 in primary schools and 30/1 in secondary school. At national level these figures are respectively 63/1 and 29/1.
With regards to the availability of tertiary education, of 31 registered higher learning institutions whose branches are distributed throughout 17 Districts of Rwanda, there is none in Nyagatare District. In Nyagatare District, 43.8% of households have less than 30 minutes of walking distance to a primary school. This rate is below the national average of 54.7% of households. 21.1% of Nyagatare District's households need to walk more than one hour to reach primary school, compared to the national average of 10.8%.

h. Access to clean water

On average, only 23% of households in Nyagatare District are within 15 minutes of walking distance of an improved water source. Nyagatare District ranks sixteenth among all districts by percentage of households within 15 minutes of walking distance to an improved water source. It is, however, important to note that 11.9% of households in Nyagatare walk more than 30 minutes to an improved source of water. The average time to an improved water source in Nyagatare District is 13.5 minutes, which is slightly better than the national average (14.4 minutes).
With regard to sanitation, Nyagatare has the highest percentage of households countrywide with access to improved sanitation facilities (92.8%). This figure is above the national average (74.4%), but only 42.3% have access to improved water sources. The EDPRS I target on sanitation was 65% of the total population with hygienic sanitation by 2012. EICV3 revealed that the majority of households use surface water (rivers or lakes) with 41%, followed by other improved sources (19%) and then public standpipes (18%). At the time of EICV3 results publication, Nyagatare District was a long way from achieving the EDPRS national target for the water sector, which was to increase the access to drinking water to 85% by 2012.

i. Gender Analysis

For the purpose of achieving poverty reduction and economic growth in a sustainable and equitable manner, key cross-cutting issues have been incorporated into the strategies to support district economic development, including gender mainstreaming, environmental protection, the rights of people with disabilities, etc.

IV. 4. Environmental Baseline for Rulindo – Gicumbi Power Line and Substations

The proposed line comprises 1.5 kilometers 110kV line and associated substations. The project crosses 2 districts respectively Rulindo and Gicumbi in the Northern Province.

IV.4.1. Biophysical Baseline for Rulindo – Gicumbi Power Line and Substation

a. Climate and Air Quality

This project site is located in the north eastern part of the country. The area enjoys generally the country's climate pattern, i.e. an equatorial climate tempered by altitude, characterized by mild, stable temperatures and moderate precipitations according to a cycle of four seasons with two dry seasons (January – February / June – August) and two rainy seasons (March – May / September – December).
The site is part of the northern highlands, characterized by relatively low temperature and high rainfall. The annual rainfall averages approximately 2,000 mm, with an average temperature of 18oC. Air quality across the Districts will be generally good outside of more settled areas. In rural homesteads, the use of wood and charcoal for cooking and heating results in proven breathing and other health issues, at the household level. There are no significant industries or mining activities that could result in poor air quality along the proposed route. Air pollution seems to occur for short periods, on a daily basis, in congested areas, resulting predominantly from exhaust fumes (being the primary source of pollution) and the morning smog caused by domestic fires.

b. Topography and Hydrology

The northern highlands encompassing the Gicumbi District prolong the Congo Nile Divide in the North East and include also the Lakes Burera and Ruhondo and their tributaries, all belonging to the Nile Basin System. Their highest summits reach 2,200 – 2,300m of altitude. The area is characterized by a relief with steep slopes and a mountainous topography character. The plateau is surrounded by steep ravines with small valleys segmented by multiple swamps. It is a succession of steep hills giving rise to a multitude of watersheds all converging towards the Great Basin of the Nile.

c. Geology and Soils

The rocks substrate belongs also to the ubendian system 1,800 to 1,700 million years old. It is made of shales, gneiss, michashists and quartzites, which have undergone strong metamorphism and are interspersed with granite. Gicumbi and Rulindo district[7] soil type is in the mountains characterized by lateritic soils and granites. In the lowlands and marshes, the soil is mainly clay soil and alluvium, the basement of the former sector of Masoro is rich in deposits of cassiterite, while other areas are rich in gravel quarries and sands. These resources are an economic potential of the district once developed.

[7] DDP Gicumbi and Rulindo, 2018

d. Flora (Vegetation)

Natural forests in the District have taken a decreasing toll due to many factors key among them being human settlement and its related impact such as use of wood for cooking. The vegetation is largely composed of food crops with woodland eucalyptus of grevilea and Cyprus also co existing. It also harbors ferns, the elagrostis (ishinge), the latter being the sign of soil degradation. The district is also home to the ordinary domestic animal species although wildlife is on a lower scale.

e. Fauna (Wildlife)

The district is never the less blessed with numerous and diverse breeds of birds ranging from crowned crane, ravens, waders, wagtails, doves, hawks, humming birds, sparrows, and many others. Reptiles like snakes, vipers, hares, jackals are also existent within the district.

No water body is traversed by the proposed power line

f. Land Use in the project area

A total of 3 ha will be affected by the 1.5 km long Rurindo – Gicumbi Power Line. These are currently used for agricultural purposes, of different crop types as illustrated in the following table

Table 21: crops fields crossed by power Rurindo – Gicumbi Power Line

District	Vegetation type	Extent (Ha)	Percentage of on entire ROW	Total (Ha)
Rurindo - Gicumbi				
Nyagatare	Banana	0.3	16.05%	3 ha
	Forest	0.4	24.76%	
	Coffee	0.1	43.32%	
	beans	0.4	6.05%	
	Maize	0.2	24.76%	
	casava	0.3	13.32%	
	sorghums	0.2	6.05%	
	Mixed Crops	1.1	44.76%	
Sub Total				**3 ha**

IV.4.2. Social Baseline for Rulindo – Gicumbi Power Line and Substation

The information for the social baseline has been sourced from the Rurindo and Gicumbi District Development Plans, other available reports and directly from local stakeholders.

The social information from these reports and data from the site has been assimilated and presented as a baseline for Rurindo – Gicumbi Power Line project

a. Administrative Boundaries (Districts / Sectors / Cells crossed by the line)

The 1.5 km proposed route of the power line crosses 2 Districts, 2 Sectors, 2 Cells, and 2 Villages in the Northern Province as detailed in Table below:

Table 22: Administrative entities crossed by the Nyamagabe – Gisagara Power Line

Province	District	Sector	Cell	Village
Rurindo- Gicumbi Power Line				
Northern Province	Gicumbi	Byumba	Gisuna	Rebero
	Rurindo	Gisuna	Gisuna	Gisuna

b. Population

As per the 2012 Population and Housing Census Provisional Results, Rulindo district has a population of 288,452 with a population density of 509 sq.km and an average Annual Growth Rate (2002-2012) of 1 % compared to the national annual growth rate of 3%.
the female composition in Rulindo district is more than male. As a matter of fact, out of a population of 288,452 in Rulindo district, 136,058 people are male and 152,394 female. Rulindo district has the highest number of females than that of males.
The average household size is 4.7 for Rulindo district, which is slightly lower than the national average of 4.8. (Rulindo has the second lowest figure among other districts in Northern Province - the averages for the other districts are: Gakenke 4.5; Musanze 4.8; Burera 5; and Gicumbi; 5.1). 26.4% of households in Rulindo district are headed by females and 2.8% are “de facto female-headed households” i.e. headed by females in the absence of a male head that is ordinarily present.

c. Economic activities

The majority of the district's population depend on Agriculture, below is a few selected crops mainly grown in the district. The main crops grown for export include coffee and tea and the quantities produced in 2012 are 2,834.2 tones 287.86 tons respectively.
Commercialization of crop production as measured by the share of harvest sold in Rulindo district is 17.7% and 20.9% at national level; the highest being Nyabihu district at 28% and Nyarugenge district being the lowest at 10.8% in commercializing its products according to the national statistics.
Households with livestock are more likely to be well-off regarding child malnutrition due to availability of income from improved agricultural yields due to cow dung fertilizers that has reduced poverty and its related evils.
As indicated by the household district statistical data, 70,467 cattle, 51,532 goats, 29,088 sheep, 11,611 pigs, 64,791 rabbits and 212,540 poultry were recorded in the district. According to EICV3, 82.1% of the households in Rulindo manage any farm animal when the national average is 69.7%. The percentage of the households receiving a cow through the government’s one cow policy is 3.7% when the national average is 3.9%.
Rulindo district's overall employment rate is 87% of the resident population aged 16 years and

above compared to the national 80.9%; while the unemployment rate is 0.4% in comparison with the national rate of 2.4% and the economic inactivity rate is 11.5%. Much as the employment seems to be high and the unemployment at only 0.4%, it is important to take into account that Rwanda's definition of unemployment is that established by the International Labour Organization (ILO) which classifies the unemployed as those people who work under one hour per week but are actively seeking work and able to start immediately

Mining and quarrying activity in the district has been done at the level of 5.3% compared to 1.0% at the national level. The mode of production in terms of quality and quantity is still very subsistence and the district needs to put in skilled personnel to increase the level of production.

d. Road network

The length of Rulindo's road network is recorded at 717.2 km, of which 43km need to be rehabilitated. Most of the feeder roads are hampered by continuous soil erosion due to the terrain nature of the district. The speed of running water destroys the road network that is linking to the markets and the main road which takes the average time of 10 minutes to get to the road. The percentage of using common transport facilities is 74.3% while on the national level it is 65.7%. The district roads are practical all the times with 21.3% compared to 27% national average. It is sometimes used with 3.8% compared to 5.8% national level. The district roads connectivity is still challenging due to the nature of the terrain.

e. Access to health care

As per EICV3 Survey, results show that the mean walking distance to a health centre in Rulindo district is 65.8 minutes. This is in comparison to 35 minutes in urban areas and 64.4 minutes in rural areas as the mean walking distance to a health centre while it is 60 minutes country-wide. When compared to urban areas, Rulindo district health centers are further from household dwellings by 30.8 minutes on average. This should be one of the focus areas that ought to be seriously addressed in the next five years in line with improving people's livelihood.

f. Energy sources

As per the findings, 2.6% of households in Rulindo district use electricity as their main source of lighting and below the national average of 10.8%, ranking the district fourth in the Northern Province after Musanze (14.5%), Gicumbi (8.9%) and Burera (3.2%) as highlighted in the table below. Gakenke has the lowest percentage within the Northern Province on this indicator, at 1%. The average percentage of households using electricity as the main source of lighting in urban areas is 46.1%, only a minimal 4.8% in rural areas and 10.8% at national level. The figures thus mean that Rulindo district is below the national, urban and rural areas averages. This implies that one of the district's priority areas going forward will be to increase access to affordable electricity among Rulindo citizens.

Energy is a key driver of growth and as the country targets fast growth of 11.5% and rapid poverty reduction, access to energy and its affordability will be pivotal to these goals during the EDPRS 2 phase. The sources of energy used for lighting by households as identified by NISR during EICV3 Survey included: electricity, oil lamp, firewood, candle, lantern, battery, and other unspecified sources. The district uses battery as the primary source of energy with 50.9% compared to 28.6% national average.

g. Education and literacy

The percentage literacy rate for Rulindo district is 71.1% among the population aged 15 and above. Although this is slightly higher than the national average of 69.7%, this indicates the extent of the much required efforts to cover the remaining percentage in order to have a literate population.

The district has got 80 nursery schools with 5,819 young pupils and 97 teachers, 81 primary schools with 69,564 pupils and 1,140 teachers, 53 secondary schools with 17,334 students and 568 teachers. The gross primary enrolment ratio for females to males is 1.03% to 0.97% respectively; the secondary enrolment for the females to males is 8539 and 6492 respectively. The pre-primary teacher enrolment rate for females is 85% and 15% for the males, the primary teacher enrolment for females is 51.2% and 48.8% for males and the secondary teacher enrolment rate for females is 40% and 60% for the males, the percentage of the head teachers for VTC are 18% females and 82% males indicating a reduction of female enrolment as you go further. The district has two operational higher institutions of learning, that is, Tumba College of Technology (TCT) and Grand Seminaire de Rutongo, five technical secondary schools (TSS) that is Apeki Tumba, ES Rwahi, Urumuri College, IBB and ES Remera Mbogo. The Vocational Training Centers (VTC) in the district includes Kajevuba, Cyamutara, Burehe, Mushongi and Shyorongi.

h. Access to clean water

According to EICV3, 74.6% of Rulindo district households use an improved drinking water source which is slightly above the National average of 74.2%. This is composed of protected water springs at 59.7% compared to the National average of 38.1%, Public standpipes at 14.3%, which is below the National average of 25.7%, boreholes 0.2% also lower than the national average 1.8% and fewer protected wells (0.2%) compared to the National average 2.3% and with no rain water taped compared to 0.4% National average. In the district 45% of the population walk the distance of less than 15 minutes to improved water source. The population percentage with water in their dwellings/yards is 0.2% compared to the national average of 5.9%. The district is still challenged by the nature of the land to enable all the population access water in their dwellings. The percentage population using between 30 minutes to one hour to reach water points is 12.9% compared to the national average of 10.3%.

Going forward, this is one of the District's utmost priorities to avail this essential resource of life to her inhabitants. Accordingly concrete strategies and efforts shall thus be assembled to supply clean water to all to 100% by 2015.

i. Poverty and vulnerability analysis

Rulindo district has 57.1% of the population that is identified as non-poor which is still low compared to 55.1% national average, 23.2% as poor compared to 20.8% national average and 19.7% as extremely poor which is an improvement in relation to 24.1% national average. But on the Provincial level, Rulindo district has the highest percentage of extreme-poor. This depicts the required efforts and need for concrete strategies that will increase the productive capacity of the population in order to come out of poverty

Vision 2020 Umurenge Programme (VUP), a flagship of the EDPRS 2008–2012 is an integrated rural and human capital development programme that aims to eradicate extreme poverty by

releasing the productive capacity of the poor. It has been the main channel of these Social Protection Interventions and is composed of three components: VUP public works (for the poor but able to work), VUP direct support (cash transfers for very poor households without labour capacity) and VUP financial services (financial services such as the Ubudehe Credit Scheme).
Besides social protection initiatives run by other ministries, there is the Girinka 'One Cow per Poor Family' programme run by the Ministry of Agriculture, the free basic education programme, subsidized subscriptions for mutual health insurance scheme, and in-kind social care services run by the Ministry of Gender and Family Promotion. These programmes greatly contribute to the tremendous reduction of poverty in Rulindo district as well as at national level. Several households have been uplifted as a result of these interventions although much is still needed in a bid to attain the over arching goal of EDPRS 2 of attaining a better quality of life for the people.

According to EICV3, the major vulnerable group in the district account to 3.6% compared to 4.5% national level. The non-major vulnerable group account to 96.5% compared to 95.6% national average.
The recipients of Girinka cow account to 3.7% when the national average is 3.9% and for the recipients of the animals under other programmes the district percentage is 18.4% when the national average is 9.4%. Here the district received more animals when you compared on the nationwide recipients.

j. Gender Analysis

Low understanding of Gender mainstreaming where even the term Gender is taken as a women issue is an important challenge for district inclusive development. For this, the district has resolved to promote the gender sensitive participation, in all position and equitable access to service across all sectors of the economy.

IV.5. Environmental Baseline for Bugesera Power Line and Substations

The proposed line comprises 18 kilometers 110kV line and 3 substations in Bugesera area. The project crosses three sectors respectively Gashora, Rilima and Juru in Bugesera District of the Eastern Province.

IV.5.1. Biophysical Baseline for Bugesera Power Line and Substation

a. Climate and Air Quality

This project site is located in the south central part of the country. The area enjoys generally the country's climate pattern, i.e. an equatorial climate tempered by altitude, characterized by mild, stable temperatures and moderate precipitations according to a cycle of four seasons with two dry seasons (January – February / June – August) and two rainy seasons (March – May / September – December).
The site is part of the eastern lowlands, characterized by high temperature and erratic rains. The annual rainfall averages approximately 1,250 mm, with an temperature varying between 20°C and 30°C. Air quality across the Districts will be generally good outside of more settled areas. In rural homesteads, the use of wood and charcoal for cooking and heating results in proven breathing and other health issues, at the household level. There are no significant

industries or mining activities that could result in poor air quality along the proposed route. Air pollution seems to occur for short periods, on a daily basis, in congested areas, resulting predominantly from exhaust fumes (being the primary source of pollution) and the morning smog caused by domestic fires.

b. Topography and Hydrology

The topography of Bugesera is characterized with a mixture of plateaus with an altitude varying between 1,100m and 1,780m and undulating hills dominated by varying heights. Most prominent of these hills are; Kabuye (1,772m the highest), Juru (1,667m), Maranyundo (1,614m), and Mwendo (1,575m). The relief is also constituted by a succession of low-plateaus with hills and dry valleys. The district is equally rich in marshlands alongside rivers; they cover an estimated area of 6,100 ha and are exploited at an average of 46.3% (Community Development Plan of Bugesera district, 2006).

c. Geology and Soils

This rock substrate of this region belongs to the Karagwe – Ankole system, 1,400 – 1,000 million years old. It is made of clay stones, shales and phyllites, limestones and quartzites. Granites are less frequent but form the substrate of the Mutara, middle Akagera and Bugesera basins. Some late pterozoic intrusive rocks produce small inselbergs.
The soils of the Bugesera District[8] are generally sandy with a low quantity of humus and are very permeable. They dry quickly even after a great rain. In summits of some plateaus located in the center and the north of the District, the soils are often made of ochre clay, whereas the sides and the tops of the plateaus are made up of rocks and schist which contain gravel, lateritic soil and quartz.

d. Flora (Vegetation)

Bugesera, two plant formations remarkably dominate: the savannas densely shrubs covering the hills, and the grassy savannas covering the dry valleys and the trays of the hills.
The vegetation is composed largely by the acacia trees, euphorbiac and the cactuses with intertwined with gramineous and of spiny bushes. One also observes other rare species that are not gigantic but supports the bushes and trailing lianas.
The grassy savannas: they are in the dry valleys and on the trays of hills and the dominant species are: botriochlora, hyparrhenia filipendula, sporobulus, pyramidalis, themedatriandra in the dry valleys and on the trays of hills, andropogondiimeri, brachyariaeminnii, hyparrheniallecontee, brachyariadictnonaura, heteropogon, centertus and laudetiasimplese.
The shrubby savannas: This part of vegetation occupies the biggest part of the whole vegetation and has different types of bushes sprinkled among the herbs of the prairies. The savanna, yellow-straw colour is in some places stained of green bushes and latches to thorns serving stanchions to the lianas and other voluble species (Umugunga, umukomagabo, umushabishabi, etc). This vegetation is largely threatened by agriculturalists.

[8] DDP Bugesera ,2018

e. Fauna (Wildlife)

Today the District is largely inhabited, but still has some land for other various activities. The colonization of this former reserve of hunt and vast prairies started in 1960s following the flooding that destroyed the fields and the dwellings in the valley of the Akagera on the one hand; and with the flux of immigrants from other regions and provinces of the country in search of farm land on the other hand. The various wild animal species were forced into exodus toward the National Park. Nevertheless, one finds the anteaters, mice, a multitude of species; birds live either in the bushes, the groves, the big trees or the terriers.
In the lakes, the marshes and the Nyabarongo, Akanyaru and Akagera rivers one can find hippos, the Crocodiles, the turtles, the water birds, the ducks and the wild geese. The lakes of the district contain fish such as Tilapia, clarias, soles, silurids, etc.

No water body is traversed by the proposed power line

f. Land Use in the Project Area

A total of 19 ha will be affected by the 18 km long Bugesera Power Line. These are currently used for agricultural purposes, of different crop types as illustrated in the following table

Table 23 : Crops field crossed by the Bugesera Power Line

District	Type of Crop	Extent (Ha)	Percentage of on entire ROW	Total (Ha)
Bugesera Power Line				
Bugesera	Banana	1.65	6.05%	**19**
	Forest	6.71	24.76%	
	Coffee	2.15	43.32%	
	Mixed Crops	8.50	31.43%	

IV.4.2. Social Baseline for Bugesera Power Line and Substation

The information for the social baseline has been sourced from the Bugesera District Development Plan, other available reports and directly from local stakeholders.
The social information from these reports and data from the site has been assimilated and presented as a baseline for Bugesera Power Line project

a. Administrative Boundaries (Districts / Sectors / Cells crossed by the line)

The 18km proposed route of the power line crosses 1 Districts, 3 Sectors, 7 Cells, and 7 Villages in the Eastern Province as detailed in Table…

Table 24: Administrative entities crossed by the Bugesera Power Line

Province	District	Sector	Cell	Village
Bugesera Power Line				
Eastern province	Bugesera	Gashora	Nyabagendwa	Cyoma
		Juru	Ramiro	Munyinya

			Ramiro	Rweru
			Kagomasi	Karusine
			Kabukuba	Kamatongo,
		Ririma	Rwihurure	Rwimpyisi
			Ruhanga	Ruhanga

b. Population

Bugesera is one of seven Districts of the Eastern Province in Rwanda. It covers a total surface area of 1337 Km² of which arable land is estimated at 91,930.34 ha. The average size of land cultivated per HH is 0,59ha. The district is composed of 15 Sectors, 72 Cells and 581 Villages with a total Population of 363,339 people in the following proportion: 177,404 males and 185,935 females (General population census 2012).
Its population Average Annual Growth Rate is 3.1%, with a population density of 282 people per km2. The population of Bugesera district is estimated at 13.9% of the whole Eastern Province population, and at 3.4% of the total population of Rwanda (General population census 2012) and 48.4% are below poverty line where 28.3% are poor and 20.1% are extremely poor (EICV3 report).

c. Economic activities

The district is at the 17th position in the country to have a percentage of Households involved in agriculture and livestock activities. Crop farming and livestock rearing are the district's economy's backbones where by 77.8% of the population depend on agriculture against 72% for national average (EICV3 2012). According to EICV3 2012, 72.3% of the HH of the district have less than 1ha of land to be cultivated.
The system of agriculture practiced in the district is a mixed and involves livestock rearing and crop farming on small parcels. However, with land consolidation policy, fields are used for one crop at a time which results into much yields and a market economy. During the last five years, the arable surface protected against erosion increased from 40,896Ha to 89,906.04Ha. Hillside surface area protected against erosion increased from 100Ha to 3,250Ha; Rice yield has risen from 4tones/Ha to 7.5tones/Ha and Maize yield increased from 3tones/Ha to 5.2tones/Ha and the land use rose from 0ha to 28,491Ha.The total number of farm ponds and valley dams hollowed out (spaded) is 420. The challenges with agriculture development in the last 5 years refers to lack of enough resources to use marshlands, failure to irrigate 3,550 ha of marshlands, insufficient use of organic fertilizers (3.1% only). Subsistence agriculture is still dominant, hence less is still produced for the market (EICV report and EDPRS1 self assessment reports, 2012).
Tourism potential: Bugesera is one of the Districts with unique tourist assets and potentials. Its natural endowments are not developed to foster a vibrant and competitive industry. Currently the sector depends on bird tracking as the major touristic activity. However it has lots of potentials based on 9 lakes, rivers, geographical set up and culture. There are virgin sites around the lakes, especially the lakes Rumira, Mirayi, Kirimbi and Kidogo. The accessibility of the lakes combined with the open space offers a great potential to develop nautical sports in the district. The proximity of Lake Gashanga to the capital city may be exploited as an area where urban inhabitants and business travellers may relax during the weekend. Endowment with wildlife, which is outside the national park— the inhabitation of Lake Rweru by crocodiles may be exploited commercially as they are within the national park and are therefore not protected. These potentials offer opportunities for Crocodile Farming, Golf Course, Border Development

and Nautical Sports.
Bugesera has 9 lakes however these have little effect on rainfall. But they can be exploited for fishing, tourism, power generation, agricultural irrigation and farming among others.
Trade and industry: Bugesera District is an area favourable for trading due to its borders. It has opportunity to improve on trade. It borders Burundi where there are booming economic activities. The district has already offered plots to investors at Nemba to build a trading center at the border. Bugesera has at least 7 trading centers (Nyamata, Ruhuha, Gashora, Nyabagendwa, Batima, Kabukuba, and Nemba border) and at least one small trading center in each Sector. It has got different modern markets built in those trading center. This is an opportunity for small and medium enterprises development. Currently trade is developing, although the private sector is still very small and hence, its employability is still low.

d. Road network

The District of Bugesera road network is to be improved and upgraded to facilitate inter-districts and cross border trade. Rural transport networks for rural and urban accessibility shall be improved by constructing and rehabilitating more feeder roads, extending tarmac and stone paved roads, constructing and rehabilitating bridges, constructing the district road side station and car parks and finally establish the District motorcycle modern park stations.

e. Access to health care

Bugesera District has various types of health care services. These services are defined to help citizens to access health services in clear and good conditions, the formal ones are set up from the sector to District level. On sector level all fifteen sector have health centres (HC) constructed by the government and development partners. All district residents are mobilised to subscribe to health insurance services (mutuelle de santé) available in each health center

f. Energy sources

The energy sector registered great achievement in the last 5 years. However there is still a long way to go. According to the EICV3 report, 4.3% of people in the district use electricity. Thanks to rural electrification program, access to electric power has increased to 12.8% so far (EWSA report, February 2013). The rest use other alternative sources for lighting like fire wood, lantern, battery among others. As for cooking, 96.3% of people in Bugesera use bio mass, 1.9% use charcoal and 1.8% use other sources including biogas and solar energy among others.

The energy sector is a key factor in rapid economic transformation and the District targets to increase access to electricity from 4.3% (EICV3) to 70% by 2017/2018 through the installation of electric lines in rural areas serving 70% of households and connecting 100 % of the household in the urban areas. The extension of street light in commercial centers and agglomeration settlements from 8.5 kms to 45.kms and the reduction of biomass consumption from 96% to 50% by increasing the use modern cooking stoves from 40% to 80%, installation of biogas digesters from 125 HH to 350HH and increase the use of solar energy in HHs and institutions from 260 HHs and 8 institutions to 450 HH and 30 Institutions.

g. Education and literacy

In the education sector, over the last 5 years, the adult literacy rate was increased from 35.9% to 72.9% (increase of 37%). 13 schools of Nine Years Basic Education (9YBE) and 16 schools of Twelve Years Basic Education were constructed and equipped with scholastic materials. ICT facilities were constructed, 2488 Laptops were provided to 9 schools and the rate of computer literacy in schools increased up to 4.4%.

Gross enrollment rate in Primary school is 142% while that of secondary is 22%. This percentage beyond 100% in primary school is due to the effort in Universal primary education program. Teacher/ pupil ratio for primary is 1:55 whereas for secondary it is 1:45. The teacher qualification rate is 98% for primary schools, 65% for secondary schools, and 45% in TVETs. The performance Rate of primary and secondary increased up to 83% and 79% respectively.

Five (5) ECDCs and 43 nursery schools were constructed. The district has 77 primary schools with 3168 classrooms, 78,300 pupils and 1249 teachers. There are 40 secondary schools with 273 classrooms, 16204 students and 573 teachers. The district has so far 2 TVETS with 736 students and 132 teachers. There are 2 science schools in the District (GS Rilima and Gashora Girls Academy) and 2 Girls' schools in Gashora and Nyamata.

h. Access to clean water

The district priority is to increase rural water coverage and accessibility to people by constructing water pipeline serving the population within 15 sectors and rehabilitating existing water pipelines, constructing water boreholes serving the population in all the 15 sectors, increasing domestic and institutional water harvesting facilities and the construction of one water plant in Kanzenze/Ntarama area.

The District focuses on improving solid and liquid waste treatment and disposal by constructing waste water/surface water drainage system, construct waste water treatment plants, construct landfill and solid waste dumping site, have all rural households with rubbish pits by 2016, and complete the rehabilitation of existing non operational water system by 2015 from Karenge to Juru. The water facilities management to be improved and water accessible to 100% of households, public and private Institutions equipped with rainwater harvesting facilities by the year 2018.

i. Poverty and vulnerability analysis

In last five years, the percentage of people below poverty line has been reduced from 66% to 48.4%, meaning a reduction of 17.6%. The percentage of the population in extreme poverty is 28.3% in Bugesera District.

The District uses different approaches initiated by the Government like One cow per family (Girinka) program, *Ubudehe* program, Vision 2020 Umurenge program (VUP), and other social assistance schemes meant for genocide survivors and demobilized soldiers, implemented by FARG and RDRC. This has improved the life of District's citizens and reduced poverty.

The current situation of VUP in Bugesera is such that 6 sectors (Kamabuye, Rweru, Ngeruka, Nyarugenge, Mareba and Mwogo) are under VUP, where the most vulnerable benefit from the whole VUP package which include; direct support, public works, financial services among others. In the last 5 years a total of 2430 HHs benefited from the VUP package with almost 365 graduating from poverty.

Other approaches were used in supporting vulnerable in the district; and has had a great

poverty reduction effect: In *Girinka* program 29% of households in Bugesera got cattle; in eradication of grass thatched houses, all of them were replaced; through *Umuganda* a lot of infrastructure were constructed like roads and classrooms; through Ubudehe a lot of projects for vulnerable were financed; through FARG, number of homeless genocide survivors were settled, education support was provided student genocide survivors and income generating projects for genocide survivors were financed; demobilized soldiers were supported with health care, vocational skills, acquisition of start- up kits and provision of housing .

As revealed above, effort to reduce poverty has passed through many programs including Girinka program. Comparatively to the national level, the population of Bugesera District has highly benefited from this one as shown in the table below.

Chapter V. Presentation and Comparison of Considered Alternatives

The identification, consideration and analysis of alternatives is an essential component of the impact assessment process, with the primary objective being to determine the best environmental and social option. This section elaborates on the alternatives that have been identified, analyses each, eliminates non-viable alternatives and determines those that can be carried forward into the comparative impact assessment.

V. 1. Identification of Alternatives

The identification of project alternatives includes the consideration of the proponent's 'preferred option', as detailed in the preliminary route design drawings. Other project alternatives are also identified through considering the following aspects:

a) Route alignment and/or location of project activities;
b) Designs of electrical infrastructure and what technology is proposed;
c) Use of alternative technology; and
d) Various implementation methods and techniques.

As part of this feasibility study, criteria for selecting line routings and ROWs were established based on technical as well as environmental considerations. The proposed line rootings and ROWs are selected among the various options, based on the dimness to satisfy the set criteria. No need to mention that environmental soundness was also equally considered than any other technical or financial considerations when selecting the line routings and ROWs.

In selecting the proposed route, the over-riding considerations were:

- the avoidance of environmentally sensitive areas and settlements,
- the minimization of the destruction of property and farms,
- easy accesses to construction and operation sites,
- low pollution level and
- favourable geotechnical conditions for the stability of foundations were also taken into account.

The above aspects are considered, and the alternatives identified for the project are listed and described in Table below:

Table 25: Description of Identified Alternatives

No	Name of Alternative	Description
1	Preferred Option: Overhead Power Lines	This alternative is as proposed by REG, detailed in the preliminary route designs received for the project, involving overhead power lines. This alternative is described in more detail in Chap 3 of this report.
2	No-Go Option	This alternative means that no distribution lines are constructed, and the situation remains as is.
3	Underground Power Lines	This alternative involves the construction and laying down of distribution lines in the ground.
4	Alternative Energy Generation: Solar	This alternative involves the generation of electricity closer to the source of where it is needed, requiring connection to a mini- or localised electricity distribution grid, depending on the scale and reach of the solar facility.
5	Construction Methods	This alternative involves the implementation of alternative

		construction methods, as compare to those proposed in Alternative 1 or the preferred option.

V. 2. Analysis of Alternatives

The alternatives that have been identified are analysed to determine which are viable alternatives to consider for the project. The analysis of alternatives is detailed in Table below:

Table 26: Analysis of Alternatives

No	Name of Alternative	Analysis
1	Preferred Option: Overhead Power Lines	REG has proposed the construction of overhead power lines as the preferred option. This option remains cost effective and is a well-established method of distributing electricity in rural areas in Rwanda and East Africa. It is proposed that the specific route to be used is mostly in the road reserve, thus significantly reducing the impacts, as well as those resulting from maintaining the RoW where necessary. This option is considered viable and is assessed.
2	No-Go Option	The No-Go option goes against the national development objectives of Rwanda, as related to the increase of access to electricity for citizens. This option is however assessed further in the impact assessment, as it provides a valuable reference against which other viable options can be compared.
3	Underground Power Lines	In some urban areas, distribution and service lines are typically placed underground, for safety and aesthetic reasons and for smaller voltages. Underground lines is not an option for higher voltages. Moreover, the proposed length of the project is approximately 137 km, which will make the use of underground lines for the entire length very costly and result in extensive earthworks/trenching along the entire route proposed; this can be 3 times more costly than overhead lines. Underground cables are also typically damaged through other future activities involving earthworks. The construction and maintenance cost of this alternative is simply too high, and it is thus considered unviable and eliminated from further consideration in this assessment.
4	Alternative Energy Generation: Solar	The use of solar energy is a consideration, since the Project Area has good solar radiation. Solar energy, whether grid-tied or standalone, cannot however service high energy demands, such as for small industries like metal workshops, for instance. Other small and medium business enterprises that could make use of solar energy, would require sizeable systems, which require significant and upfront capital investment; a typical limitation in the establishment of such facilities. Typically, solar energy systems can be used for domestic applications, as well as installed in a hybrid application and tie into the national or local grid. In the case of the national grid, the necessary baseload required to ensure reliable and uninterrupted power supply, is in place through the national energy mix. Small and medium-size businesses that can afford to install grid-tie systems, would do so more readily if the surplus electricity produced could be sold back into the grid or allow for the accumulation of electricity credits. In the instance of this project, solar energy generation is

		not seen to be a viable option, as it will not be able to provide more cost effective and reliable electricity to trading centres in rural areas. This option is thus eliminated from the assessment. Such systems may in the future become more economically viable
5	Construction Methods and Techniques	The construction methods and techniques proposed in Alternative 1 involve largely hand work and have insignificant direct impacts. The consideration of this separate option is thus unnecessary, as it already falls into the preferred option described above. This alternative is thus eliminated

V.3. Consideration of Viable Alternatives

The analysis of alternatives shows that 2 alternatives are worth further consideration and assessment in Section 8 of this document. These viable alternatives include the following:
a) Preferred Option: Overhead Power Lines; and
b) No-Go Option
Although the No-Go option is not supportive of national development objectives, it does provide a useful comparison when assessing the preferred option. Both the above alternatives are thus assessed further, in consideration to their respective impacts.

Chapter VI: Potential Environmental and Social Impacts

VI.1. Introduction

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise from the undertaking of an activity and findings used to inform the competent authority's decision as to whether the activity should be either authorized, authorized subject to conditions that will mitigate the impacts to within acceptable levels, or refused.

In this sense, impacts are defined as the changes in an environmental parameter that result from undertaking an activity. These changes are the difference between effects on an environmental parameter where the activity is undertaken compared to that where the activity is not undertaken, and occur over a specific period and within a defined area.

VI.2. Impacts Types

Different types of impacts may occur from the implementation of this type of project, which may be positive or negative, and can be categorized as being either direct (primary), indirect (secondary) or cumulative.

Direct impacts are impacts that caused directly by the activity and generally occur at the same time and at the place of the activity (for example, dust generation excavation activities). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Indirect impacts are induced changes that may occur as a result of the activity (for example the use of water from a natural source at the activity will reduce the capacity for supply to other users). These types of impacts include all the potential impacts that either do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity (Jain et al, 1993; Fuggle and Rabie, 1994).

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (for example, removal of vegetation may cause soil erosion, leading to excessive sediments in receiving stream, leading to reduced sunlight penetrating the water and thus reducing dissolved oxygen in the water and adversely affecting aquatic life and water quality).
Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts (Jain et al, 1993).

VI.3. Identification of Potential Impacts

In order to identify the potential impacts of this project, we used the matrix of identification which

is an adaptation of the matrix of Leopold et al. (1971).

The matrix was designed for the assessment of impacts associated with almost any type of development project. Its main strength is a checklist that incorporates qualitative information on cause-and-effect relationships. The Leopold system is an open-cell matrix containing project actions (sources of impacts) along the vertical axis and environmental 'characteristics' and 'conditions' along the horizontal axis.

VI.4 Methodological approach

VI.4.1. Desk Review

To ensure this level of compliance and to recognize internationally accepted best management practices, the desk review focused on the following:

- Overall biophysical environmental impact and constraints (with reference to soils and underlying geology, impact on flora and fauna populations);
- Overall impact on the surrounding environment due to surface structures, and associated infrastructure;
- Water and wastewater management;
- Hydrology and hydrogeology;
- Process emission (both gaseous and effluent) and air quality from the operations and potential effects, including dust;
- Method of waste disposal (solids, slurries, liquids) to minimize environmental impact; and
- Site rehabilitation.

VI.4.2. Data Collection methodology

In the framework of the environmental impact assessment, consultations were initiated in each district administrations, and communities affected by the project. That approach was meant to collect complementary information, to gather comments and to know the concerns raised by the project in regards with the biophysical environment.

The Data collection was done using tablets in order to manage short time we had and control data collected every day. The 2 days training sessions also gave the survey team an opportunity to assess the quality of questionnaires and covered the following activities:

(i) Familiarize all surveyors with all questions in questionnaire, including their purpose, range of potential answers, how to prompt if needed, sensitiveness of the questions if any, and so on;
(ii) Accustom all surveyors with the use of tablets and survey CTO software along data collection;
(iii) Test the surveyors for their learning ability, knowledge, interviewing skills, and so on;
(iv) Decide how to resolve confusing issues related to interviewing, when and how to prompt.

A trainer was at the same time in charge of electronic data management, processing and

analysis. The training exercise consisted of reviewing all questions in the questionnaire one by one, explaining the intent of them, their possible responses and how the questions should be asked. Surveyors were trained through interactive presentation exercises, group assignments, mock interviews and role play, and at the end, given tests to demonstrate their level of understanding of the questionnaire.

This exercise was double fold as surveyors were at the same time being trained to understand the questionnaire but also to be able to apply data collection using electronic devices-tablets for the survey CTO collects software application.

To abide with time constraint, four teams were deployed concurrently on four sites while one team remained in the office in Kigali for data entry and report narrative activities. Each team had the following members:

- One experienced EIA expert as team coordinator;
- One experienced topographic surveyor
- Another environmentalist to oversee all site environmental issues
- One enumerator

Consultations were carried out at two levels:

- At the central level, that consultation involved resource persons with an expertise in one or the other area tackled by the study (land, forestry, environment, quarries, and mines, water resource management, etc.);
- At the decentralized level, local administrative authorities were consulted from the provincial level, districts up to the sectors, particularly those from regions that will be affected by the three power line projects.

The interview method was used during consultation with experts from different institutions at the central level, as well as with local authorities from provinces, districts and sectors. An introductory letter to the different authorities was thus prepared by IBC Group and was given to the team of consultants working on the environment component. That letter requested the authorities to facilitate the work and to provide the information needed by the visiting consultants. Before consultation, an appointment was first of all requested with each given authority or expert, and during the interview, we would present the copy of the introductory letter as well as an information leaflet that would give a brief introduction of the power transmission lines project (List of the interviewed persons in Appendix 1).

The purpose for that public consultation is summarized through the following:

- To gather new environment information in the study area;
- To inform authorities and experts about the project and particularly those from institutions with an interest in the project due to their areas of competence or responsibility;
- To know the concerns on environmental components that will be affected and proposal for potential mitigation measures;
- To discuss synergies and possibilities of integration of the project into other projects underway or being planned, or to identify possible duplication with the latter;

- To identify ways of cooperation with the various institutions at different phases of the project implementation.

VI.4.3. Impact Assessment Methodology

The methodology used for impact assessments in this report will relate to risk assessment (whereby certain impacts to the environment are identified), risk evaluation (by using a stipulated assessment criteria whereby impacts are given a rating or weighting and obtaining an overall rating or significance of an impact) and risk management (relating directly to applicable mitigation measures to be implemented to manage a risk of an impact in the best interest of a society; Schogren, 1990). The guideline criteria followed in this study are presented in table below.

Table 27: Assessing criteria and ratings used for determining impact significance

Nature or Status of the Impact: The type of effect the activity would have on the environment		
Status		**Description**
Positive:		a benefit to the holistic environment
Negative:		a cost to the holistic environment
Neutral:		no cost or benefit
Duration of the Impact: The lifetime of the impact		
Score	**Duration**	**Description**
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more
Extent or Scale of the Impact: The distance from source that impacts may be experienced		
Score	**Extent**	**Description**
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	National	Affects country
Reversibility of the Impact: To what degree its influence on the relevant environment can be negated.		
Score	**Reversibility**	**Description**
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable
Intensity or Magnitude of the Impact: Severity of the negative and magnitude of positive impacts		
Score	**Severe/beneficial effect**	**Description**
1	Low	Little effect - negligible disturbance/benefit
2	Low to moderate	Effects observable - environmental impacts reversible with time
3	Moderate	Effects observable - impacts reversible with rehabilitation
4	Moderate to high	Extensive effects - irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration

The Probability of the Impact: Describes the likelihood of the impact actually occurring		
Score	**Rating**	**Description**
1	Unlikely	Less than 15% sure of an impact occurring
2	Possible	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur
4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur
The Consequence (C)		= Magnitude/Intensity (M/I) + Extent (E) + Duration (D) + Reversibility (R).
The Significance (S)		= Consequence (C) x Probability (P)

Determination of Significance

After assessment of an impact in accordance to the criteria described above, the significance of an impact can be determined. The various ratings as indicated above are accorded to these criteria. These ratings are then used to calculate a significance (S) rating and are formulated by adding the sum of ratings given to the extent (E), duration (D), Reversibility (R) and intensity (I) and then multiplying the sum with the probability (P) of an impact as follows:

Significance (S) = (E+D+R+I) X P

The significance rating is described as follows:

Table 28: Significance rating table

Score out of 100	Significance
1 to 20	Low
21 to 39	Low to Moderate
40 to 60	Moderate
61 to 79	Moderate to high
80 to 100	High

VI.5 Source of impacts

VI.5.1 Manpower

Construction works for high voltage lines will require several teams of works according to their expertise:

- After clearing the right-of-way of lines, a team of surveyors sets the location and materialize the four legs of each tower;
- A team of civil engineers follows to carry out excavations of tower bases and install, regulate and pour concrete for bases (generally four feet) of towers;
- A team for establishing the tower structure intervenes with a variable output, generally 1 to 5 towers a day;
- A team of wire and cable pullers continues the work of cable installation;

- Cleanup and rehabilitation of work sites.

Although the majority of works is done manually (tree cutting, excavation, equipment transportation, etc.), machinery on site may be used. Those are overhead shovels, trucks and power jib cranes. All works will be limited to the nominal right-of-way and access tracks and carried out during daytime.

VI.5.2 Works

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

- Construction of roads to access work sites: encroachment in wetlands, fragmentation of wildlife habitats;
- Clearing of the line's right-of-way with width of 30 m and access roads including tree cutting and waste management: loss of vegetation;
- Management of site installations including construction of campsite: water and soil pollution from inadequate installations of wastewater and solid, liquid and hazardous materials management, etc.;
- Arrival and presence of workers in rural areas: overuse of local resources such as water, fuel wood and other natural resources such as fauna (poaching);
- Transportation and traffic related to movements of manpower, machinery and construction materials: noise, dust, security;
- Excavation works and other earthmoving and tower construction activities:
- soil erosion, encroachment in wetlands;
- Waste and contaminants (engine oil, fuel) disposal: soil and water pollution.
- The main sources of negative impacts during the operational phase are mainly:
- Maintenance (clearing) of the right-of-way: permanent control of vegetation using mechanical or chemical methods;
- Presence of line as an obstacle to movement of birds: mortality through collision;
- Presence in the landscape of line itself: landscape degradation.

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

VI.6 Nature of impacts

The project will generate impacts during the construction phase as well as during the operational one. It will require construction works that will extend over at least three years. Indeed, the five new 110kV transmission lines will be interconnecting with existing substations on one side (Rwinkwavu, Gisagara, Rulindo and Rukarara), 7 new substations (Three in Bugesera, one in Huye, one in Kirehe, one in Gicumbi) and 3 other substations to be upgraded (Rukara, Rilima,). Moreover, the maintenance of the ROW and the line requires periodic access to the facilities to ensure their maintenance all along the project lifespan.

a) Permanent impacts

Those impacts are related to the operational and maintenance phases of the transmission lines and substations. Maintenance and repair of equipments include all activities required to ensure at all times the good operation of lines and substations. Maintenance consists especially in preventive measures for verification and repair of equipments. Teams especially trained for that task will move under conductors on the ground, at various intervals, in order to make observations on conductors, insulators, towers, etc. Inspections will also take place in

substations for transformers and other equipments. The ground patrol is done from the existing road network with four-wheel drive vehicles, whatever the season. Repair consists in rehabilitation of defective equipment. According to the nature of the break or fault, light or heavy machinery will have to move in the ROW of lines or substations.

Maintenance of the ROW also requires regular clearing of vegetation in order to reduce short-circuit risks caused by electric arcing.

The main permanent environmental impacts are:

- Soil erosion;
- Permanent loss of vegetation (trees and shrubs) in the ROW of lines and substations;
- Destruction of terrestrial wildlife habitats;
- Risks for birds' collision with the wires and structures;
- Permanent loss of small portions of wetland required for construction of towers.

Impacts on particularly attractive landscapes are also considered in the environmental impact assessment because they will persist all long the project lifetime.

b) Temporary impacts

Temporary impacts are those related to the construction phase (of transmission lines and substations). They mainly consist in:

- Dust and noise emission;
- Soil erosion;
- Degradation of water quality;
- Soil contamination by a bad waste management or accidental spilling of hydrocarbons;
- Displacement of wildlife.

c) Power line

The progress of the construction phase will be as follows:

- Siting and topographic survey of the line;
- Tree removal and clearing of the ROW over a width of 30 m ;
- Preparation of access roads and their maintenance;
- Soil testing;
- Complete construction of foundations, including grounding and measuring of towers' earth resistance;
- Erection of towers;
- Installation of cables including stringing and drawing in of cables;
- Site clean-up;
- Different tests and acceptance.

d) Access roads

In order for the site to move from tower to tower, a road will be created along the line, only where there is no yet an access. Works will consist in creating longitudinal access roads to the various towers of the line and transverse access roads that will make it easy to join quickly the different points of the line from main roads. Longitudinal tracks will be established in the ROW of the line. Those tracks will be appropriately leveled and will include a sufficient lateral clearing of vegetation.

General features of the access roads will be:

- Width of the track: ±5 m ;
- Accessible by a four-wheel drive vehicle even during the rainy season;
- Equipped with smaller works for crossing seasonal watercourses (inverts, gabions, culverts).

The contractor will maintain in ridable state the access tracks required to reach the towers. They should be ready on the day of work completion.

Passage from one tower to another will preferably done in straight line, in the ROW, along the line or in coming back by a curb ramp to tracks and existing works.

The layout will be established in advance, during a visit that will include the site environmental surveillance officer (RSEC). Some minor modifications could be made later on basis of experience acquired during works, but they will have to be approved by the RSEC.

e) Electrical substations

Works regarding to new and upgraded substations are localized in their limits. They will however include:

- Site leveling, excavation and compaction;
- foundations;
- construction of control room and possibly a room for guards;
- enclosure wall and gate;
- roads (both access roads and internal tracks within the substation);
- ditches for cables;
- drainage;
- Equipment installation.

VI.7. Impact Description

Impacts on the natural environment related to the different phases of the project may be described in the following table.

VI.7.1 Potential Impacts during construction phase

Table 29- Summary of impacts on the natural environment

Activities	Physical Environment			Biological Environment				Landscape
	soil	Air	Water	Flora	Fauna and wildlife habitat	Protected Areas	Species with precarious status	Landscape
Preparation Phase								
Picketing of ROW			x	x	x	x	x	
Clearing of ROW			x	x	x	x	x	
Construction Phase								
Preparation of access	x	x	x	x	x	x	x	x

Activities	Physical Environment			Biological Environment				Landscape
	soil	Air	Water	Flora	Fauna and wildlife habitat	Protected Areas	Species with precarious status	Landscape
Construction of towers and substations	x	x	x	x		x	x	x
Transport of equipment		x			x		x	
Erection of towers and installation of cables					x	x	x	x
Site cleanup activities		x	x	x	x	x	x	
Operation Phase								
Maintenance of ROW				x	x	x	x	x
Operation & Maintenance of equipments				x				x

a) Soils

The impacts of construction of transmission lines and substations on the soils are particularly associated with activities for site preparation, excavation for preparation of access roads, tower erection and transport of equipment as well as installation of conductors.

Tower erection will require foundations covering about 2.5 m by 2.5 m (6.25 m²) with a depth of 2.5 m, depending on the soil's conditions. Thus, affected areas are relatively reduced. Excavation works will leave those areas vegetation-free, submitting the soil of steep sectors to erosion. In addition, excavated materials will be generated and may be transported by erosion and be found in various water courses. Those materials could be reused for the development of access tracks when possible.

Soils exposed on steep slopes are particularly sensitive to erosion while hydrosoils are subject to formation of ruts. During the rainy season, impacts on soils will therefore be significantly more important than in the dry season. Thus, if the soil is wet, works could suffer delays. Those delays will have to be caught up with by using more important means (materials, personnel), which will increase the cost for works.

Figure 3ocky mountain in Rwinkwavu and Gisagara

Figure: Rock soil at Kirehe on towel site
Oil and fuel used by equipments during the transmission line construction may also contaminate soil and affect biodiversity, crops and human health.

In order to avoid too many negative impacts on the soils by the works, areas with difficult topography should be spared during the establishment of access roads, as well as wetlands where soils are highly saturated.

a) Construction of access tracks

In order to have access to the power line, a track will have to be constructed at several places. During the drafting of this report, the location of access points are not defined because it will be the duty of the Contractor in charge of construction works.

Changes made to the topographic profile during the construction of tracks or for the substations' earthworks are permanent. However, remodelled surfaces will be reduced: ±5 m of width for the track and only the area of substations.

The nature of the soil along the ROW being not uniform and topography being very different, a change in the soil structure is to be projected. In most cases, the spoils will serve to fill in the small lows, but the provision of exogenous materials is required for the tracks to be more stable and sustainable, the latter having to serve later as access tracks for maintenance teams.

Just as mentioned previously, if works are undertaken in dry season, impacts will be reduced. In wet season, rains will cause instability and erodibility of the soil's superficial layers as well as a significant increase of water levels, the tracks will require a thicker layer of spoils. In that case, the surface of the terrain will be modified by the presence of a berm where the track will be established. In this case, works will also require much more resources (materials, personnel), which will increase the cost associated with the cost in addition to higher impacts.

The soils in the different areas concerned by this study where the transmission lines pass by are in three major pedologic groups, respectively, one part of ferralsols from the central plateau, xero-ferralsols of the eastern part and soils of valleys. Overall, soils are generally deep in some places, with a clay horizon and sensitive to erosion. However, in general, soft silt soils and those in areas with steep slopes represent soils that are likely to be more sensitive to erosion. Furthermore, risks of rockslide are probable in areas with fragile soils with schizo-quartzic materials and in areas where abrupt summits, mostly ferrisols, are subject to intense erosion.

There are areas that is particularly prone to erosion has been identified in Nyamagabe, Huye, Gisagara, Rulindo and Gicumbi.

The establishments of the different substations will not either causes any significant impact on soils. Indeed, the latter was scheduled to receive all the equipments required for the project.

b) Air and noise

Risks of air contamination are associated with dust and gas emissions. People at risk are those living in settlements along the roads used by heavy vehicles during construction and near worksites. The issue of noise and air contamination is also linked to tree removal activities and construction of access roads to the ROW, because works will normally be undertaken during the dry season.

Combustion of fuel from vehicles used for transport of building materials is a source of air contamination, the same as for burning grass and trees from vegetation cutting to clear the line.

In some cases, works will be carried out near residences and businesses along the ROW or near the substations. Noise will result from the use of machinery and traffic during construction. Except for urbanized areas, where the normal level of noise is higher, construction will therefore cause for a certain period of time an increase in the ambient noise level.

Noise associated with construction can disturb households and neighboring communities of the ROW as well as the local wildlife. That temporary impact can be minimized by the use of various mitigation measures described under chapter 8.

c) Water

The main watercourses of the study area are mainly Mirayi,kidogo and Rumira lakes in Gashora sector Bugesera district and many other streams. There HV lines also will cross several marshlands. The construction and maintenance of transmission lines may also have both short and long-term effects on water resources. The quality of water may be indirectly affected by soil erosion and sedimentation caused by vehicles' wading crossing, construction of temporary or permanent bridges for access roads, or during clearing of the ROW. Works undertaken will not have to cause any significant modification of watercourse flowing during the establishment of bridges, inverts, pipe arches, or culverts.

Drainage modifications due to the preparation of tower foundations, stream siltation following soil erosion and pollution caused by oil and fuel spilling, as well as encroachment in wetlands can as well cause significant impacts on water resources.

Final determination of the towers' base during construction will have to avoid watercourses, which will limit the impact on the water environment.

Kanyabutimba

Gacencero

Karuruma Stream

During the wet season, heavy rains may be responsible for soil surface erosion. Thus, accumulated materials for construction of the tracks or the substations are likely, if their grains are fine, to be washed away and carried to watercourses, increasing therefore the muddiness of water already high in this season. Devices for retention and sedimentation of suspended particles (deflectors, pits) will have to be installed.

The piezometric level being sometimes at the ground level, chemical components resulting from the concrete of tower foundations may be found in drinking water pumped from in boreholes. Other contaminants resulting from site activities (lubricants, waste oils, solvents, etc.) may be spilled accidentally and found in the water system or ground water. In order to protect ground water, no tower should be located in a radius of less than 50 m around a borehole used for drinking water supply.

Whether in the dry season or wet season, contractors working on behalf of the project promoter must ensure that no discharge from the machinery (crankcase oil) or from the work camps (organic pollution) should be observed in the environment.

The transmission line as such will have little permanent impact on hydrography or water resources. Drainage modifications will however be long-term because the access roads and foundations of towers could cause modification to the flow pattern for surface water.
In contrast, access roads may introduce long-term damages on a large area. If the construction works are undertaken during the rainy season, their establishment will cause formation of puddles and water areas and even divert the natural flow of some watercourses, because of the importance of soil movement (cut and fill). That is why, during the realization of works, as previously indicated, the road track will be constructed with all structures required for water drainage.

The different substations have transformers that contain several tons of insulating oil. In order to avoid any contamination, there is provision to place a watertight cesspool with big capacity under each one of them. No oil containing polychlorinated biphenyl (PCB) will be used.

Generally, whatever the equipment maintained, modified or repaired, technical teams will ensure that no leakage of contaminating or hazardous materials occurs. In case of accident, those materials will be recovered and stored in waterproof tanks for their processing.

When they are mitigated through implementation of mitigation measures, impacts associated with pollution and siltation are short-term; otherwise, they may be long-term and irreversible.

Particularly in Bugesera,Huye, Gisagara and Kirehe districts, the transmission line crosses a multitude of water areas made of water sources, streams, rivers, lakes and swamps. Those water resources can be affected by the tower construction related works. The period at high risk for pollution of water environments is during heavy rains of March and April (large-scale rainy season) as well as from November to December (small-scale rainy season).

During construction, spoils will be produced during excavations of tower foundations. Those materials left in scattered piles could cause siltation of streams, which would lead to pollution. In addition, affected wetlands, especially those that will have several towers, will be prone to sedimentation. Those deposits will indeed change the water's normal flow in wetlands and flooding plains leading to siltation and flooding. Those impacts could be particularly felt in the surrounding Mirayi,kidogo and Rumira lakes in Gashora.

d) Flora

Construction of a transmission line through wetlands, forests, coffee and banana plantations found along the proposed ROW requires trees and brush to be cleared from the ROW. That clearing may have an impact on the number, health and survival of species within the forest among which many are rare. The ROW is most likely to fragment forest blocks into small forest areas. Fragmentation makes the species within the forest more vulnerable to predators and parasites, and increases competition by species coming from the edge side.

Natural vegetation and crops will be introduced during the clearing of access roads, the ROW and segments required for the campsite and work areas (manipulation of building materials). Damages to vegetation lead to destruction of habitat. The regular maintenance within the ROW of transmission lines will require clearing of vegetation in the ROW as well as along access roads. That means that no vegetation of more than 4 to 5 m of height will be tolerated within the ROW.

In a general sense, natural environments concerned by the project are degraded and ecologically poor because of expansion of human activity. The suppression of the woody component of the vegetation and the regular maintenance mowing will finally cause a localized change into savanna for the vegetation. The grassland thus created will increase risks of bushfires that are already very common in the region.

Nonetheless, the ROW of 25 m width and especially the track could create an area for access, surveillance, and even firebreak, on condition that no human pressure is imposed. The ROW of the transmission line will undoubtedly become a penetration track for peasants in areas so far uncleared because of access problems. Those new access tracks should indirectly lead to an increase of cleared acreage for cultivation.

Forests with eucalyptus trees and other agroforestry species exist almost everywhere in the ROW. They will be partially destroyed in order to clear the ROW and access roads. Areas to deforest were estimated based on satellite imagery and inventories undertaken in the ROW. The following table gives the areas to deforest in the different parts of the ROW.

Table 30- Average of areas to deforest in the ROW

Transmission Line / Substation	Length (Km)	Area to deforest (ha)
Rwinkwavu – Kirehe	50.00	29.0
Rukarara – Huye – Gisagara	70.71	26.9
Bugesera Substation		
Bugesera Industrial Park – Bugesera Airport	18.00	6.71
Gabiro – Nyagatare	26.70	10.75
Rurindo – Gicumbi	1.50	-
Total Area		**72.55**

Flora that will be affected by the construction of the transmission lines and substations is mainly the one found in the forests and wetlands with still natural vegetation. In case of groups of trees, the clearing of the ROW is likely to break them into small wooded areas. Fragmentation of forest habitats make flora and fauna species more vulnerable to parasites and competition by species from outside.

Trees that are directly in the ROW are estimated at 72.55 ha with net majority of eucalyptuses (90.3 %). Those trees continue to be the source of timber and firewood for both rural and urban populations. The clearing of the ROW and the construction of access tracks will lead to tree cutting and therefore to the increase of deficit in domestic energy resources of the population in the study area, among whom more than 90 % use wood for lighting fire.

Environmental inventories helped to confirm the existence of two natural forests of savanna woodland have been located in the area that will be crossed by the transmission line.

e) Wildlife

Impacts on wildlife mainly include destruction of habitats, poaching and frightening by construction noise. The natural environment analysis shows relative wildlife poverty because of human presence, hunting, bushfires and degradation of biotopes.

Indeed, given the extent of sections inhabited at many places along the lines and human activities associated, wild mammals and birds have almost disappeared from the proposed corridors in some segments mainly associated with watercourses and wetlands (swamplands: birds). Birds will be affected by the noise generated by construction works such as transport, clearing, etc. It is most probable that birds and other animals from swamplands will migrate to other zones where they will then be threatened by poaching. However, that impact will only be temporary and will stop once construction works are completed.

	
Grey-headed sparrow	speckled mousebird

Figure 4: Birds species observed in projects sites

The impact on the fauna of open forests and savannas is small considering the low significance of the ROW in regards with the limited changes that the lines impose on the existing environment, already made of very open spaces.

The presence of substations will not at all disturb the mammals because they are in a highly anthropized context where wildlife is not much present.

f) Landscape

Relief features and vegetation offer beautiful and very attractive landscapes in several sections of the projects. Spectacular views on the landscape are a good potential for tourism attraction.

Construction of 110 kV transmission lines and substations can be considered as an element of incoherence in a natural landscape, because it changes the visual field of agroforestry landscapes all along the corridor. By their nature and due to spatial entities that they link, HV transmission lines hardly have a logical link with the landscape they cross. Moreover, they can hardly be hidden. Whether they are coupled or not with other infrastructure, that incompatibility remains significant.
The construction of transmission lines also requires delimitation of a corridor to establish towers and conductors. In wooded areas, where minimal distance for vertical clearance must be maintained between conductors and vegetation, it is necessary to cut and remove trees. Impacts on the visual environment also depend on the observer's perspective.

From roads, towns and villages or tourist sites, the corridor and the transmission line may have a significant negative impact on the landscape.

In order to reduce the visual impact of the line, landscape mitigation measures will have to be implemented. Among them, the following can be mentioned:

- Selection of a type of pylon adapted to the environment: less high, single-

legged, etc. ;

- camouflage of pylons by coloration in harmony with surrounding environment; planting trees or hedges in order to block view in the ROW and camouflage particularly exposed and/or visible pylons

To mitigate the impact, the transmission corridor and the associated structures should be kept low, not higher than the hills, to minimize the visual impact of the transmission line.

VI.7.2 Potential Impacts during operational phase

a) Potential Impacts due to Electromagnetic fields

A high-voltage transmission line generates an electric field (related to the current) these electric and magnetic fields are also produced naturally (terrestrial magnetic fields) as well as any professional or household electric equipment (television, razor, drill, etc.).

Power transmission lines generate lower non-ionizing radiation levels. For a 110 kV line electric field is approximately 2500 VOLTS/m under cables, 250 at 25 m from axis and 25 at 100 m from axis. The magnetic field does not exceed 15 pT (micro Tesla) under conductors and quickly decreases with distance from the line axis: 2 HT to 30 m, 0,2 pjT 1 00 m (source: EDF,1994).

In comparison, an electric razor generates a magnetic field of 1000T 3 cm.

Numerous working groups have been established to study the impact of electric and magnetic fields on health. To date, no epidemiological study helped to establish a clear causal relationship between health and exposure to electromagnetic fields.

Reports from the National Radiological Protection Board (NRPB, 1992), the Committee on Interagency Radiation Research and Policy Coordination (ORAU, 1992) and the Commission nationale de santé au travail (France, 1992), conclude that, in the literature, there is not sufficient convincing epidemiological elements to support that exposure to very low frequency electromagnetic such as produced by power lines have hazardous to health effects.

b) Potential Impacts of transmission lines on the flora

In the ROW of the line, vegetation should always be cleared and removed to avoid affecting operation of equipments and that will be done regularly by clearing. Natural vegetation along the line, especially for the relics of savannas and forest remnant at the side of swamps, will be cleared. Eucalyptus trees will also be eliminated in the ROW, which has an impact on the population's lifestyle and biodiversity in those areas. There will be not only savanna and trees, but also operation will accelerate disappearing of that natural vegetation because the surrounding population will benefit from the clearing to extend their fields.

Vegetation clearing could disturb wildlife that is in the remnant patches of gallery forest and swamps, by putting more pressure on animals that live in that environment. The population along that line could take advantage of that vegetation clearing to hunt fauna that lives in that area.

c) Potential Social Impacts

Positive Impacts

In rural centres and even in some smaller villages near to the main roads small-scale handicraft units and workshops could profit from a permanent and stable electricity supply.

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. Supply of pumped water will be facilitated and there will be safer, more efficient operation of key services, through electricity access to villages along the transmission and distribution lines served.

Potential beneficiary enterprises affected by and contributing to regional socio-economic transformation will be small industries such as saw mills and joineries, grain mills and other agricultural processing and storage businesses. Data management with computers is enabled along with communication facilities like Internet and charging of mobile phones; also, 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. Social and environmental costs, not least in noise and air pollution, associated with existing generator usage will be reduced, with more limited requirement for firewood cutting and collection.

While major attention will focus on loss of income due to temporary disturbance to fields or grazing areas, and on health conditions related to the influx of foreign workers, positive opportunities to PAPs may be presented in the form of temporary employment during the construction phase, as well as through income generated by the sale of food and other consumables to migrant workers.

It is expected that the proposed project will create numerous direct jobs, many of which will be sourced from the project area. A significant proportion of these jobs will go to people in the lower income brackets. Direct income effect will come from salaries and wages paid to workers and income from locally sourced contracts for services such as security, bush clearing, catering and transport. The project will thus give a boost to the local economy, indirectly benefiting small-scale farmers and local small enterprises.

Negative Impacts

The main potential adverse impacts of the Project would occur mainly during the construction stage in the form of:

- Permanent loss of land under various uses due to land acquisition for establishment of transmission towers;
- Temporary and limited air and noise pollution due to construction activities;
- Minor permanent loss of vegetation due to land acquisition for the reasons mentioned above and for the establishment of right of way (ROW);
- Minor permanent loss of commercially important trees due to the establishment of ROW and construction activities;
- Minor permanent loss of biodiversity as a result of loss of flora and loss of habitat for fauna;
- Increased risk of communicable diseases during the construction phase.

Additionally, potential public safety hazards are enhanced for a project such as the proposed transmission line project when the local population has not been properly educated and sensitized with regard to the potential hazards.

VI.8 Summary of Potential Impacts

The detailed presentation and significance of impacts for the construction of 110kv lines and substations projects are found in the Appendix 3 and table 14 presents the summary of the project's impacts on the natural environments.

Table 31: The summary of the project's impacts on the natural environments.

Phase of Works	Environmental Component	Type of impact	Duration of impact	Extend of impact	Intensity of impact	Importance of impact
Construction						
Loss of land	Social	Opportunity cost for the land owner to use the land concerned by ROW	Permanent	Local	Average	Average
Loss of commercially trees	social	Opportunity cost to grow and get income from selling the trees	Permanent	Local	Average	Minor
Public safety related to electricity mishandling	Social	Risk of electrocution due to little experience with electricity	Temporary	Local	Minor	Minor
Marking and clearing of the ROW	Flora	Destruction of vegetation coverage	Permanent	Common	Average	Major
	Fauna	Loss of habitats	Permanent	Common	Low	Average
Earthworks including preparation of access tracks and foundations of towers	Soils	Erosion Formation of road ruts	Temporary	Common	Low	Average
	Water	Contamination by accidental discharges of contaminants Modification for surface drainage	Temporary	Specific	Low	Minor
	Air	Liberation of dusts and gas	Temporary	Specific	Low	Minor
	Flora	Destruction of species	Permanent	Specific	Low	Minor
Site installations including campsites and work areas	Soils	Contamination by domestic materials	Temporary	Specific	Low	Minor
	Water	Contamination through solid, liquid or hazardous materials and wastewater	Temporary	Specific	Low	Minor
Presence of workers	Water	Overexploitation of resource	Temporary	Specific	Low	Minor
	Flora	Harvest trees as fuel	Temporary	Specific	Low	Minor
	Fauna	Disturbance of fauna and	Temporary	Specific	Average	Average

		poaching				
Transport and circulation	Air	Noise and dust	Temporary	Specific	Low	Minor
Operation						
Maintenance of ROW	Flora	Destruction of vegetation cover	Permanent	Common	Average	Major
Presence of power line						
	Landscape	Visual degradation of landscapes	Permanent	Specific	High	Major

Chapter VII: Mitigation & Enhancement Measures

VII.1 Impact mitigation measures

All the proposed mitigation measures should be implemented during construction and integrated in the contractor's Agreement if appropriate.

VII.1.1 Mitigation measures during the pre-construction phase

a) Establishment of project and landscape mitigation measures

The efficient reduction of the visual impact of pylons or line is generally difficult. Therefore, it is preferable to talk about landscape mitigation measures. Visual absorption is indeed only provided for when the visibility area is reduced, the "complex" landscape (including many components), and less "readable" (disorganized). In practical terms, absorption may be achieved by putting the line along the edge, turn around a line of ridge, etc.

The success of landscape mitigation measures results from the use of landscape components (vegetation, relief, and housing) and consideration of visibility zone. Inclusion of a power line into landscape is therefore facilitated by the presence of large size components near it. The observer then tends to underestimate the real size of towers in regards with what surrounds them. In contrast, when other components of the landscape are of small size, then pylons will appear big.

Also, the peri-urban environment with small size will not be able to dissimulate the structures.

It is possible to mitigate the effect of vertical structures by proposing lower towers and therefore less spaced, but also by establishing structures in such a way as to seek visual support on slopes in order to follow best the shapes of the landform.

In case avoidance of the visual perimeter is not possible, it should be advisable searching for mountain slopes, and they should be kept away if possible from the areas of ridge crossing.

The impact introduced by the establishment of a HV link may be mitigated by using at best existing configurations and by choosing the best-adapted technical infrastructure.

In semi-urban environments, solutions to mitigate the visual impact may be an alignment of pylons because a less rectilinear layout will cause an impression of "visual disorder"

b) Soil conservation

During the planning and especially access to work sites, impacts regarding risks of increased erosion or deterioration of soils may be mitigated through:

- The use of existing tracks, if possible;
- The creation of new tracks restricted to its minimum needed and in consultation with interested landowners and authorities.

c) Special provisions to be included in Contractors' contract

A part from the measures taken into account during the design, preventive measures will be also implemented during realization of works.

Thus, in the context of works that the Promoter undertakes or has undertaken by others, he will define general and technical clauses for supply, setting and test of network, supply and erection of electric equipment, as well as implementation of all works related to the project.

Those clauses constitute the best practices in terms of construction of electric network and ensure the project is well integrated into the environment. The successful bidder for the project must comply fully with the laws and regulations in force in Rwanda, regarding environment protection and rehabilitation of environments affected by the project. Additionally, the contract will have to require from the Contractor to prepare and implement:

- A drainage and erosion control plan;
- A rehabilitation plan for disturbed areas;
- A waste management plan3 ;
- An emergency plan in case of spilling of contaminants;
- A fuel and other hazardous materials management plan.

In addition to those clauses, specific mitigation measures recommended in the context of the environmental study should also be included into the project and their implementation will have to be enforced during works through environment surveillance and monitoring program.

VII.1.2 Mitigation measures during the construction phase

(i) Site organization

Among the measures that will have to be implemented and respected in the site general organization during construction works, there are:

- To mark out physically (pegging, ribbon, etc.) the limits of the ROW within which works will have to be undertaken;
- On cultivated land, to make only one provisional access track in consultation with the owners and occupants before opening the site;
- On the site and access roads' area, to restrict work timetable between 07h00 and 21h00 in order to limit disturbance of local populations with noise;
- The Contractor must regularly maintain equipments (air hammer, compressors, pile drivers, crushing machines, etc.) and any other noisy material that constitute sources of significant nuisance. He also must ensure that silencers of his machinery are always in good condition;
- To undertake preventive maintenance of machinery and vehicles in order to prevent fuel and lubricant leakages;
- To take necessary measures to avoid any spillage of oil products during supply of vehicles and machinery, and to provide for an emergency plan in case of accidental spillage of contaminants;
- To have at disposal a response kit in case of accidental spillage of contaminants near the place where works are being undertaken.

Construction camps will be equipped with septic tanks and disposal fields to receive wastewater or latrines (at minimum one for 20 people).

In accordance with the Plan for storage of fuel and other hazardous materials, the Contractor must recover and store in liquid tight containers, correctly identified, all hazardous materials and contaminant products generated in the normal course of site operations (used oils, solvents, plasters, etc.), then send them to potential take-overs or another site with appropriate authorization to handle them.

At the end of works, the Contractor will ensure that the site is restored to its initial condition and will clean up all materials, wastes and littering. All the surfaces affected will have to be restored to their natural condition or to the nearest possible condition to the initial condition; similarly, site areas will have to be rehabilitated after the completion of works.

During all the duration of works, the Officer in charge of environmental surveillance (RSE) will ensure compliance with all environmental standards and implementation of environmental recommendations. Implementation of those general measures of site organization will therefore help to mitigate the project's incidences on environment and integrate it harmoniously into the environment.

(ii) Solid waste management

Solid waste management is a major issue in such kind of project. Indeed, the project will extend to several sites distributed over a distance of several kilometers. Production of solid wastes (non-dangerous) should be likened to the one of a small town. Littering collection is then at risk of meeting serious logistic issues. Waste management systems in sections crossed are indeed often lacking. Before starting the work, the Contractor shall submit a waste management plan for approval. The project promoter should encourage the three 3 Rs: Recover, Reuse, and Recycle. The use of hazardous materials must be reduced or eliminated, and the use of public landfills must be restricted as much as possible.

Construction debris (woods, steel, cartons etc.) produced on work sites should be picked up with work progress on site. Then those debris will be recovered and recycled or otherwise eliminated, either by disposed in controlled landfills, or by burial in an appropriate site, approved by the site RSE and by local authorities.

In all cases, the Contractor will be responsible for the sound waste management on construction site and in workers' campsite. In addition, before starting of works, the Contractor will have to submit a Waste Management Plan to the RSE for approval.

(iii) Oil products management

Fuel needs for the site machinery and generation of power (generators) required for site works will have to be specified. It seems probable that the Contractor must prepare a fuel storage park and install oil product tanks to meet the needs.

Before starting works, the Contractor will have to present a Management Plan for fuel and other hazardous materials. That plan includes, among other things, an estimate of fuel needs, location and mode of storage, as well as environment protection measures that will be taken, including a contingence plan in case of accidental spillage.The Plan will also have to provide for

areas dedicated for maintenance of site vehicles (oil change, repair, etc.).

In case of contamination, costs for soil and water rehabilitation are at the Contractor charge.

(iv) Protection of natural environment and vegetation

Measures shall be implemented during the marking and initial clearing of the ROW:

- Before clearing the ROW and work areas, the Contractor will have to ensure first of all that the limits of clearing were marked on the ground before that start of work, with markers, and he must obtain authorization from the site environmental surveillance officer;
- The RSE will ensure to respect the limits of deforestation that will have been indicated at the construction site;
- Only the clearing need for construction works is authorized. The clearing must be limited to the minimum require;
- To conserve all the vegetation (trees, shrubs, herbaceous, crops) present at the edge of watercourses and on steep slopes;
- In order to respect the flow of water and biodiversity, to maintain watercourses, streams, swamps and trenches free of any vegetation debris or any other wastes;
- Wood harvested must be cutted into sections, put and left on site for the benefit of landowners or the community;
- To compensate the loss of tree vegetation by planting of equivalent areas.

(v) Wildlife protection

In order to protect wildlife resources often already at risk:

- To forbid collection of fauna or flora species;
- To prohibit possession of firearms on site and to prohibit hunting and fishing activities at all times for construction site workers;
- To strictly control poaching and take the offenders to the authorities.

(vi) Water protection

Several measures need to be implemented in order to limit accidental risks of polluting surface water and ground water:

- No watercourse may be forded. To erect preferably a bridge or a culvert to allow vehicles and construction equipments to cross a watercourse. The construction of such facilities must respect best practices and should not reduce the width of the watercourse by more than 20%. Their size must allow free flood flow. They should not either impede migration of fish. During the development of such facilities, to avoid sensitive periods such as high waters or spawn of fish;
- In order to protect ground water during construction, ensure that no tower is erected in a distance less than 50 m around a well or borehole serving for drinking water supply;
- To forbid any temporary or permanent disposal of excavated materials in a watercourse or in an environment likely to be flooded, except for towers and tower struts;

- To prohibit supply of vehicles and machinery and maintenance of equipments (oil change, repair) at less than 30 meters from watercourses and flood-prone areas;
- To prohibit any storage of fuel at less than 60 meters from a watercourse. The Contractor will have to seek approval by RSE for locations that may serve for handling and storage of hazardous materials;
- Before beginning of works, to require from the Contractor to submit an emergency plan in case of leakage or accidental spillage of contaminant;
- In case of pollution, to trigger the procedure of intervention in case of emergency provided for in the above-mentioned plan.

During the wet season, heavy rains may be responsible for surface soil erosion. Thus, materials accumulated for constructions of the track or substations are likely, if their grains are very fine, to be carried away and transported towards watercourses by increasing therefore the already high turbidity of water during this season.

Before start of works, the Contractor must submit an erosion control plan to the RSE for approval; He must install devices for retention and sedimentation of suspension particles (deflectors, pits).

(vii) Earthwork

A series of measures must be introduced to limit general impacts of earthmoving.

- To require from the Contractor to present a drainage and erosion control plan;
- To reuse materials resulting from spoils such as ballast materials, if their geotechnical features allow. Otherwise, to dispose all excess materials (soil, stones, blocks, etc.) in such a ways as to reduce their visual impact and allow their optimal integration into the surrounding landscape. To backfill areas of disposal of materials so that once they are completed, their final geometry fits in the natural shape of land and facilitates their integration to the landscape;
- Not to authorize any solid waste (wood, steel, etc.) nor contaminated materials in the ballasts;
- If need be and if possible, to stabilize, to drain an to pitch or replant spoils and ballasts;
- In order to limit at maximum the loss of arable soils during earthmoving, to scour and separately store the layer of top soil, then to proceed to excavation in depth of the remainder soils;
- The Contractor will have to prepare and implement a plan for rehabilitation of disturbed areas including areas of storage of ballast materials;
- Immediately after intervening in one section, and without waiting for the end of work site, to stabilize soils against erosion by using indigenous species with rapid growth;
- At the end of works, to reuse the top soil for rehabilitation of disturbed sites;
- Not to wait until the end of construction work to proceed to rehabilitation works of disturbed areas, but to proceed with progress of works;
- To check performance of stabilization measures after rains and to take necessary corrective measures to ensure efficiency of measures in the future;

- During earthmoving works near residences, to use water as dust suppressor in order to reduce at minimum the dust coming from movement of trucks and other construction equipment.

VII.2 Mitigation measures during the operation phase

During the operation phase, mitigation measures of impacts will have to be implemented, namely:

- To use mechanical methods for vegetation control in the ROWs instead of phytocides;
- To promote the use of ROW for farmers in order to reduce the use of vegetation control methods;
- To introduce a monitoring program for impacts of the line:
    - Avian fauna;
    - Water quality;
    - Erosion;
    - Landscape.

VII.3 Mitigation Measures for Social Impacts

Regarding Social Impacts, mitigation measures should include:

Pre-construction phase

Land acquisition will be carried out in accordance with the prevalent laws of the three countries and as per the AfDB guidelines on resettlement, which require identification and quantification of any impacts on land-based livelihood, and adequate compensation to landowners and people relying on the land for their livelihood. The compensation would be paid, before the start of works as per the resettlement plans. The effective payment of the compensation would be one of the loan conditions.

A detailed analysis of resettlement impact and mitigation strategies is done in the context of the Resettlement Action Plan.

Construction Phase

The basic environmental management principles to follow during construction of the HV transmission lines are outlined below. Adherence to these guidelines will further reduce the potential adverse impacts which may arise during construction:

- Consult villagers regarding location of valued village resources and locate transmission lines to avoid these features.
- 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.
- Clear only a narrow path to facilitate pulling the nylon rope between towers to string conductors.
- Strictly define ROW clearing activities in the contract specifications.

- String conductors under tension to minimize potential damage to remaining ground vegetation.
- Decommission and rehabilitate excess temporary access tracks as soon as they are no longer required.
- 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.

All site clearance works shall be carried out within defined perimeters and only when necessary. The maximum permissible time lapse between site clearing and initiation of construction operations shall be reduced to a minimum. Vegetation along the ROW shall be kept to the barest minimum to permit safe operation. Trees felled from site shall be re-utilized for the benefit of the host communities or as otherwise requested in consultation with the communities. Areas cleared in excess of operational requirements during construction shall be restored with indigenous species and maintained for at least three years

VII.4 Environmental and Social Management Plan (ESMP)

The Environmental and Social Management Plan (ESMP) provides the conditions under which the project must be implemented, upon approval from the Rwanda Development Board (RDB)[9]. The provisions of the ESMP must be implemented in final design stages, as well as the construction and operational period of the project. The provisions of the ESMP, as related to the pending approval from REMA, would in the case of approval, be legally binding. It is thus critical that the provisions of the ESMP be fully implemented to enhance positive impacts and avoid significant negative environmental and social impacts.
It is important to note that this ESMP is focused on the design, construction and operational phases of the proposed project. Preliminary design specifications from an environmental and social point of view were taken into consideration in the assessment and compilation of the ESIA, providing input with regards to possible mitigation measures to reduce environmental and social impacts.

VII.4.1. Roles and Responsibilities

REG's Role
REG, as the proponent of the project, is responsible for the effective implementation of the project, in compliance with all approvals. REG must ensure compliance with the conditions inherent to the ESMP approval by RDB. REG is the project proponent and shall therefore be the entity responsible for monitoring the implementation of the ESMP and compliance with the RDB Certificate of Approval. However, REG will appoint a construction Contractor, who will be responsible for implementing the proposed construction of the five 110kV power lines and hence implement the proposed mitigation measures documented in this ESMP. REG should also appoint an Environmental Supervising Consultant to monitor and report on compliance with ESMP, as has been elaborated upon below.

[99] Although the functions for issuance of EIA / ESIA Certificate for Investment projects lies with RDB, however, REMA retains the overall responsibilities for Environmental Management, including monitoring and audit

REG's Environmental Specialist

For the purposes of implementing the conditions contained herein, the REG's Environmental Specialist shall be the responsible person for ensuring that the provisions of this ESMP, as well as the Certificate of Approval once/if issued by RDB, are complied with during the planning, construction and operation of the power distribution project. The REG Environmental Specialist and/ or appointed E&S Supervising Consultant/s will be responsible for issuing instructions to the Contractor where environmental and social considerations call for action. The REG Environmental Specialist and/or appointed E&S Supervising Consultant/s shall submit regular written reports to REG, but not less frequently than on a monthly basis.

The REG Environmental Specialist and/or appointed E&S Supervising Consultant/s will be responsible for the monitoring, reviewing and verifying of compliance with the ESMP and conditions of the Certificate of Approval by the Contractor. His / Her duties in this regard will include, *inter alia*, the following:

a) Confirming that the Certificate of Approval and all permits required in terms of the applicable legislation have been obtained prior to the activity commencing;
b) Monitoring and verifying that the ESMP and Conditions of Authorisation in the Certificate of Approval are adhered to at all times and taking action if environmental and social specifications are not followed, issuing fines if and when necessary;
c) Monitoring and verifying that environmental and social impacts are prevented or kept to a minimum;
d) Reviewing and approving method statements, to ensure that the environmental and social specifications contained within this ESMP and Certificate of Approval are adhered to;
e) Inspecting the site and surrounding areas on a regular basis with regards to compliance with the ESMP and Certificate of Approval;
f) Monitoring the undertaking by the Contractor of environmental and social awareness training for all new personnel on site during construction and for maintenance activities during operation;
g) Ensuring that activities on site comply with all relevant environmental and social legislation;
h) Ordering the removal of, person(s) and/or equipment not complying with the specifications of the ESMP and/or Certificate of Approval;
i) Undertaking a continual internal review of the ESMP and submitting any changes to REG and/or RDB and the concerned Lead Agencies (in case of major changes) for review and approval;
j) Checking the register of complaints maintained and ensuring that the correct actions are/were taken in response to these complaints;
k) Liaise on a monthly basis with the relevant Local Grievance Redress Committees, and higher level Grievance Redress Committees, as necessary;
l) Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance;
m) Reporting all incidences of non-compliance to the management of REG;
n) Conducting monthly environmental and social performance audits in respect of the activities undertaken relating to the project;
o) Keeping a photographic record of progress on site during construction from an environmental and social perspective;

p) Recommending additional environmental and social protection measures, shall these be necessary; and
q) Providing report back on any environmental and social issues at site meetings.

The REG Environmental Specialist and/or appointed E&S Supervising Consultant/s must have:

(i) A good working knowledge of all relevant environmental and social policies, legislation, guidelines and standards both locally in Rwanda or internationally;
(ii) ii) The ability to conduct inspections and audits and to produce thorough, readable and informative reports;
(iii) The ability to manage public communication and complaints;
(iv) The ability to think holistically about the structure, functioning and performance of environmental systems; and
(v) Proven competence in the application of the following integrated environmental management tools (including, Environmental and Social Impact Assessment, Environmental and Social Management Plans/Programmes, Environmental and Social Auditing, mitigation optimisation of impacts, Monitoring and Evaluation of Impacts and Environmental and Social Management Systems).

The REG Environmental Specialist and/or appointed E&S Supervising Consultant/s must be fully conversant with the ESMP and Certificate of Approval (once considered and issued) for the proposed construction of the distribution line and ensure compliance with all relevant national environmental legislation and international good practices.

Contractor's Role

The Contractor is responsible for constructing the power lines, within the conditions of the ESMP and is liable to pay fines for transgressions and non-compliance with the provisions of the ESMP. The construction Contractor must, in line with this ESM prepare a document clearly outlining and demonstrating the environmental and social responsibilities, accountability and liability. The Contractor shall assign responsibilities for the following:

a) Documenting the required environmental and social policy and strategy;
b) Respond to all environmental and social aspects which require action, under the core elements and sub-elements of the ESMP through compiling E&S Action Plans;
c) Overall design, development and implementation of the Method Statements;
d) Reporting structures;
e) Actions to be taken to ensure compliance; and
f) Implementing the ESMP in all stages/phases of the power distribution project.

All official communication and reporting lines including instructions, directives and information shall be channelled according to the organisational structure developed by the Contractor and approved by the REG Environmental Specialist and/or E&S Supervising Consultant/s. The Contractor will provide for personnel to deal with stakeholder liaison and grievance procedures.
The Contractor shall further:

a) Be responsible for the finalisation of Action Plans and Method Statements under the ESMP, prior to project commencement where necessary, which through being implemented will achieve the environmental and social specifications contained within the ESMP and the relevant requirements contained in the Certificate of Approval, once/if issued by RDB;

b) Be responsible for the overall implementation of the ESMP in accordance with the requirements of REG and the Certificate of Approval, once/if issued by RDB;
c) Ensure that all third parties who carry out all or part of the Contractor's obligations under the Contract, comply with the requirements of this ESMP; and
d) Work closely with the REG E&S Specialist and/or the E&S Supervising Consultant/s.

Role of REG Environmental Officer and External E&S Supervising Consultant

REG, as the proponent of the project, is responsible for putting in place an Environmental Officer (EO), with the option to appoint an external Environmental & Social (E&S) Supervising Consultant/s, to provide the required support for the duration of at least the construction phase of the project. The EO must monitor and report on compliance with the project approvals and the provisions of the ESMP. In the case of an external E&S Supervising Consultant/s being appointed, such can act as an independent assessor, auditor and authority on issues of compliance on the Project Site, as required by REA and reporting directly to REG and REMA, as well as other key stakeholders.

The EO has the right to issue a stop order on work and/or non-compliance fines, if non-compliance on the part of the Contractor is resulting in significantly detrimental environmental and social impacts.

The intervals at which E&S audits shall be undertaken shall be agreed upon by REG, the Contractor, E&S Supervising Consultant/s and REMA. It is suggested that at least quarterly audits, and more regular monthly site monitoring, if necessary, be conducted and reported, with annual audits, and final audit upon completion of the construction phase. An E&S audit programme should be put in place for the project, to manage the audits and make sure compliance monitoring remains on track. The environmental audit programme shall at least include the following:

a) A comprehensive quarterly and annual E&S audit will be undertaken, as well as a final completion audit at the completion of the construction phase to verify compliance with the ESMP, Certificate of Approval and all applicable environmental legislation. An audit report shall contain recommendations on E&S management activities which are required to be implemented within the subsequent phase. The auditor shall report concurrently to the Contractor, REG and REMA;
b) Periodic environmental audits to be undertaken during the operations phase to verify ongoing satisfactory environmental management performance. These audits must be followed up with appropriate remedial and corrective actions as shall the audit findings demonstrate any non-conformance or non-compliance with the specifications of the ESMP; and
c) Compile and agree on (together with REG) a template for the audit report, prior to the commencement of the project.

REMA's Role

REMA (through RDB) is responsible for the consideration of the application, to either approve or deny the project. If the project is approved, then REMA (through RDB) is responsible for issuing a Certificate of Approval, as well as monitoring compliance with the conditions of approval.

District

District authorities and their respective local government structures in the 11 Districts (Kayonza, Ngoma, Kirehe; Nyamagabe, Huye, Gisagara; Bugesera; Gatsibo, Nyagatare; Rurindo, Gicumbi) that are traversed by the proposed 5 power lines will be vital in the implementation of

the project by mobilising political goodwill and sensitising communities on the project. In addition, the District's Vice Mayors for Development, and Social Affairs, as well as the District Environment Officers (DEOs) and their counterparts at Sector level will be responsible for reviewing and monitoring the implementation of the environmental and social aspects of the project in their area of jurisdiction. The Vice Mayors and Sector Executives as well as the District Engineers (DEs), DEOs in the respective areas of project implementation will monitor the project to ensure that mitigation measures are adequate and are well integrated in the overall project implementation framework. The DEs, DEOs and CDOs can also review this report and provide comments to REMA, prior to final decision by REMA.
The role of the DEOs and CDOs will also be to ensure that the proposed project is implemented in accordance with REMA conditions of approval. They will also attend the site inspection and project meetings and be able to point out issues of concern. Specifically, the CDOs will oversee implementation of compensation aspects wherever these may arise and other social issues such as complaints.

Local Communities
The local communities play an important role in the final design and construction phases. During the ground-truthing of the final designs, Project Affected Persons (PAPs) can give further input into the specific placement of poles and the proposed route, where it affects them directly. Woodlots and crops that are damaged and/or lost due to the project must be dealt with in the RAP. Local communities also have an important role to play in compliance monitoring, to make sure to report any non-compliance issues or concerns to the Local Grievance Redress Committee, CDO, DEO, E&S Supervising Consultant, REG, REMA and/or the AfDB.

Other Key Stakeholders
Other key stakeholders relevant for the monitoring of health, welfare and education all play an important role of keeping watch on the project, to all contribute in meaningful ways to the monitoring of the impacts, as well as engaging fully with key issues, to better manage undesirable consequences resulting from infrastructure projects throughout Rwanda.

VII.4.2. Physical Cultural Resource (PCR) and Chance Finds Procedure

In the case of a Physical Cultural Resource (PCR) chance find, the following procedures shall be followed:

1. Stop the construction activities around the chance find;
2. Delineate the discovered site or area;
3. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present, until the responsible local authorities and the responsible Institution take over;
4. Notify the supervisory Project Engineer and REG, who in turn will notify the responsible local authorities and the responsible Institution (within 24 hours or less);
5. The responsible Institution would oversee protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the Technicians and Specialists of the responsible Institution (within 24 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to historical, socio sensitivity and cultural heritage;

6. Decisions on how to handle the finding shall be taken by the responsible Institution. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
7. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the responsible Institution;
8. These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Project Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed;
9. Construction work will resume only after authorisation is given by the responsible local authorities and the responsible Institution concerning the safeguard of the heritage; and
10. Relevant findings will be recorded in AfDB Implementation Supervision Reports and Implementation Completion Reports will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

VII.4.3. Grievance Redress Mechanism (GRM)

The Article 33 and 34 of the Expropriation Law No 32/2015 of 11/06/2015 provides complaints procedures for individuals dissatisfied with the value of their compensation. The Article 33 of the expropriation Law stipulates that dissatisfied persons have a period of 10 days from the application for counter valuation by the person to be expropriated. This application should be done within 7 days after the approval of the valuation report by the expropriator.

In practice, grievances and disputes that are most likely during the implementation of a resettlement program are the following:

- Misidentification of assets or mistakes in valuing them
- Disputes over plot limits, either between the affected person and the Project, or between two neighbors;
- Dispute over the ownership of a given asset (two individuals claim to be the owner of this asset); e.g. due to recent change of asset ownership
- Disagreement over the valuation of a plot or other asset; and
- Successions, divorces, and other family issues, resulting in disputes between heirs and other family members, over ownership or ownership shares for a given asset.

Grievance Management Mechanism

The experience has shown that many grievances derive from misunderstandings of the Project Policy, or result from neighbor conflicts, which can usually be solved through adequate mediation using customary rules. Most grievances can be settled with additional explanation efforts and some mediation using customary disputes settlement mechanisms:

- Through explanations (for instance explain in detail how the Project calculated the complainant's compensation and that the same rules apply to all); or
- Through arbitration, resorting to elders or individuals well regarded by the community and external to it.

In contrast, resorting to the judicial system often results in long delays before a case is processed, may result in significant expenses to the complainant, and requires a complex mechanism, involving experts and lawyers, which can fall well beyond the complainant's control,

and be counterproductive to him/her. Also, courts may declare themselves not competent for matters related to informally owned property. Therefore, the Project will put in place an extra-judicial mechanism for managing grievances and disputes arising from the resettlement process based on explanation and mediation by third parties. Each of the affected persons will be able to trigger this mechanism, while still being able to resort to the judicial system. Procedures relevant to this amicable mechanism are detailed below. It will include three different levels:

Registration of the complaint, grievance or dispute case by REG in collaboration with local authorities;

Processing of the grievance or dispute until closure is established (within 15 days) based on evidence that acceptable action was taken by REG; and

In the event where the complainant is not satisfied with action taken by REG as a result of the complaint, an amicable mediation can be triggered involving a mediation committee independent from the Project.

Amicable Resolution Mechanism

Complaints that cannot be closed to the complainant's satisfaction will be handed over to a mediation committee that will include the following individuals:

One representative of the local Administration;

One REG representative acting as an observer;

Three representatives of the affected people, including at least one woman, chosen from the Resettlement and Compensation Committees (RCC) and/or amongst community based organizations, elders, customary authorities,

One representative of an NGO or of a religious organization present in the project area.

The main function of the committee would be arbitration and negotiation based on transparent and fair hearing of the cases of the parties in dispute between PAPs and the implementing agencies for local government. The committee gives solution to grievances related to compensation amounts, delays in payment of compensation or provision of different type of resettlement assistance

Processing

After a complaint or dispute has been registered, REG will prepare the technical background to the complaint (for instance, the proposed compensation amount, the list of meetings and interviews with the complainant, a description of the exact reason of the dispute, etc.) for consideration by the mediation committee. The complainant(s) will be invited before the mediation committee, which will mediate and attempt to propose a solution acceptable to both parties (REG and complainant). If need be, other meetings will be held and the committee may resort to one of its members to arbitrate in a less formal framework than meetings, if appropriate.

If reached, the agreement will be sanctioned by a settlement agreement signed by the parties, and the chair of the mediation committee will be responsible for monitoring the implementation of this agreement, which will include all references to the applicable local law provisions.

Grievance resolution is encouraged to be resolved at Cell level, as they are aware of and involved in the whole process. If the grievance is not resolved in this way, local courts (ABUNZI) should be used. If not resolved then the high court or court of appeal of Rwanda remains an avenue for voicing and resolving these complaints.

Grievance Redress Committee (GRC) and composition

First, all interested stakeholders have developed a Grievance Redress Mechanism (GRM) for potential use. The aim of the grievance redress mechanism is to achieve mutually agreed resolution of grievances raised by such stakeholders. This grievance redress mechanism ensures that complaints and grievances are addressed in good faith and through a transparent and impartial process, but one which is culturally acceptable.

As the GRM works within existing legal and cultural frameworks, it will be effectively implemented by a **Grievance Redress Committee (GRC)**, which is organized in such a way that it will comprise of local community representative, PAPs representative, local authority representative at village and cell levels, Contractor and Supervising firm representatives.

As mandated by the law on gender equality, women representation will make up at least 30% of the GRC. All PAPs representatives will be directly elected by their peers and the number of members may vary depending on the context and particularities of each sub-project site characteristics.

Table 32: Proposed Members of GRC and their respective roles under the project

No	Member of GRC	Roles and Responsibilities
1	President (PAPs representative)	• Chairing meetings; • Give direction on how received grievances will be processed; • Assign organizational responsibility for proposing a response; • Referring cases to next level; • Speaks on behalf of GRC and she/he is the one to report to the cell or the sector administration level; • Represents the interests of aggrieved parties. • Give feedback on the efficiency of GRM.
2	Village Leader	• Represents local government at village level; • Resolves and lead community level grievance redress; • Sends out notices for meetings; • Records all grievance received and report them to next local level
3	Cell Executive Secretary	• Proposes responses to grievances and lead in resolving community grievance unsolved from village level; • Records and reports all grievances received from village leaders; • Chairs sensitization meeting at the cell level during public consultations meetings; • Assists and guides in identifying vulnerable and disadvantaged groups within the cell. • Signs the valuations sheets for compensation facilitate a proper Resettlement Plan
4	Women and youth Representatives	• Represent the interests of women and youth; • Advocate for equity and equal opportunities; • Help in prevention of sexual harassment and promote wellbeing of the women and youth;

		• Take part in resolution of any grievance related to sexual harassment and any gender domestic violence that may arise; • Mobilize women and youth to be active in income generating activities specifically for opportunities in the project's intervention areas.
5	Contractor representative	• Receive and log complaints/grievances, note date and time, contact details, nature of complaint and inform complainant of when to expect response; • Handle complaints revolved around nuisance resulted from construction and endeavor to handle them satisfactory; • Inform engineer (supervisor) and GRC of received complaints/grievances and outcomes and forward unresolved complaints/grievance to GRC • Attend community meetings, respond and react to PAPs complaints raised concerning the contractor.
6	Supervising firm representative	• Represent client (REG); • Ensure that all grievances raised have been responded to, and that the contractor responds to the complaints raised concerning them, • Attend community meetings and respond to all concerns related to the project from community • Report on monthly basis the progress of GRM process.

VII.4.4. Implementing the ESMP

The Environment and Social Management Plan (ESMP) must be implemented on condition of approval, with full compliance, to enhance positive impacts and avoid significant negative impacts. The mitigation measures and estimated implementation costs are detailed in Table….. Monitoring and reporting on actions taken is required on a regular basis.

The mechanism of how to monitor, audit, report and action interventions, is detailed in Chap VIII. The costing for the implementation of the ESMP remains indicative, depends on how the project is implemented and will need to be further accurately estimated once the project is divided into implementable sections, or upon appointment of the construction Contractor, as applicable.

The 1st step in implementing the ESMP is for the REG Environmental Officer (EO) to drive environmental and social, monitoring, compliance auditing and intervention. The appointment of an external and independent Environmental and Social (E&S) Supervising Consultant/s can assist in fulfilling this role.

Table 33: Environmental Management Plan (EMP) for construction of 110kV Lines and Substations project

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
General Provisions					
All impacts	a. Achieve full compliance with the AfDB EHS Construction Guidelines, upon which this b. ESMP is based, through regularly monitoring and address on-site situations and through applying the relevant mitigation measures. c. The Environmental Officer can issue penalties, in consultation with relevant authorities, for d. incidents of non-compliance, and always in liaison with REMA.	Entire routes	REG	REG Environmental Specialist in place. Dedicate the EO for the project	-
All impacts	a. Sensitise all Contractors, including foremen, supervisors and workers in the requirement for and full implementation of the ESMP. b. Employ an adequately qualified and experienced Environmental Officer to assist with specific route and pole location of the infrastructure, prior to the construction of such, as well as regular independent monitoring throughout the construction and rehabilitation stages of the project. c. Put in place simple Construction Method Statements for activities in sensitive areas, like wetland areas, forest reserves, areas with natural vegetation and densely populated areas.	Entire routes	Contractor	REG Environmental Specialist in place. Dedicate the EO for the project	45,0000
PRE-CONSTRUCTION PHASE					
Community expectations from the project	a. To organize workshops for information and awareness raising for authorities, community-based organizations/ NGOs and communities at all levels (national, districts and sectors) b. To produce and distribute/disseminate information tools by taking into account concerns of communities in all communication channels.	Communities located near ROW of each transmission line / substation	REG / Project Establishment Unit (PEU) in collaboration with REMA	- REMA; - Self-monitoring - by REG	50,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Planning of environmental management requirements	• Preparation of Contractor's environmental management plans. • A drainage and erosion control plan; • A rehabilitation plan for disturbed areas; A waste management plan; • An intervention plan in case of spillage of contaminants; • A fuel and other hazardous materials management plan.	All building sites and all activities	Contractor	- REMA; - Self-monitoring by REG	To be part of the Contractor budget
Authorization for clearing ROW and license to borrow construction materials	• To obtain authorizations from owners and authorities before proceeding with clearing of ROW. • To use only authorized quarries and recognized suppliers of sand, gravels and quarry materials. To respect all requirements of authorizations. • To apply by writing for an authorization to operate a borrowing from landowners with prior commitment to rehabilitate borrow areas to RSE.	In all ROW and work sites	Contractor	- REMA; - Self-monitoring by REG	Is part of works to be executed by Contractor
Sources of supply of construction materials	To identify and use quarries recognized by State (quarry materials, gravels and sands).	The riparian area of ROW	Contractor	- REMA; - Self-monitoring by REG	Is part of works to be executed by Contractor
Visual quality of landscape	• In case the visual quality of landscapes is affected, to plant tree hedges to camouflage the ROW. • To avoid as much as possible the location of pylons on mountain ridges or vegetation-free hilltops.	Particularly specified places with tourism potential	Contractor	- REMA; - Self-monitoring by REG	Is part of the works to be executed

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Establishment of worksites and temporary construction site areas	• Before installing worker camps or other work areas, the Contractor shall submit its location to RSE for approval. The RSE will ensure that the landowner has given his agreement and that the environmental management measures will be introduced. • To grant relevant landowners compensation for their assets and rental of land for duration of works. • To prepare development plans for basic campsites and other construction sites and have them approved by SEO. • To plan safe discharge of all wastes, avoid spillage, leakages of soil pollutants and water resources of receipt tanks. • The Contractor will e responsible for payments of all costs generated for clean-up of pollutions caused by his activities and will have to fully compensate relevant people. • Supply drinking water and maintain its quality and ensure sanitation and discharge of wastes from construction sites. • Consider facilities of access to existing public infrastructure (roads, drinking water supply, electricity and communication cover. • Consider topography and site soil quality, its location in regards with a wetland (250m). • Provide to SEO for approval a campsite plan with indications of its limits and an environmental management plan for site (capacity of campsite in number of people, solid waste and wastewater, drinking water and electricity supply, etc.).	Construction campsite, landowners and riparian communities of all ROWs	Contractor	- REMA; - Self-monitoring by REG	Is part of works to be executed by Contractor
CONSTRUCTION PHASE					
Soils erosion and compaction	• Restrict the activities to the minimum possible; • Use appropriate machinery and/or protective • boarding during soil stripping; • Remove and stockpile topsoil, subsoils and any parent material separately; • Use the stockpiled material in the origin area; • Topsoil storage periods shall be kept to a minimum.	All ROWs	Contractor/ REG	- REMA; - Self-monitoring - by REG	Included in the project budget

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Changes of landscape - Visual impact	• Use paint with colors that match the environment to minimize visual impact of the structure; • Retain a belt of trees/bush around facilities built to minimize visual impact.	All ROWs	Contractor	- REMA; - Self-monitoring by REG	15,000
Noise and Vibration	• Restrict construction and operation of heavy machines to daylight; • Ensure noise emissions are kept within the • Rwanda standards; • Reduce needed truck movements by careful planning of needs of construction material; • Regular and effective equipment maintenance in order to ensure all machinery is in good working order and use does not generate excess noise/vibration. • Etc.	All ROWs	Contractor	- REMA; - Self-monitoring by REG, - District authorities	15,000
Loss of vegetation cover and plant diversity	- Align the excavations to follow existing parallel - water pipeline in order to minimize the loss of vegetation cover; - In areas of dense vegetation cover, the removal of vegetation must be restricted to the minimum necessary width; etc.	All ROWs	Contractor	- REMA, - Self-monitoring by REG	18,000
Disturbance and mortality of terrestrial fauna	- Restrict construction activities do the daylight; - Inspect the area to be cleared for any terrestrial fauna before bush clearing and digging; - Protect any trench left overnight with a net fence to block fauna from being trapped inside; - Capture and release fauna away from the direct influence zone (including species trapped in the trenches);	All ROWs	Contractor	- REMA, - Self-monitoring by REG	24,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Disturbance of Surface Water	- Zero liquid effluent during normal operation.	All ROWs	- Contractor/ REG	-REMA, -RNRA, - Self-monitoring by REG	
Liquid waste management	- All waste water must be contained on site; - Consider reuse, recycling, and treatment of process water where feasible - The quality and quantity of waste water discharged in the environment, including storm water be managed and monitored and be of adequate quality prior to release;	All ROWs	- Contractor/ REG	- REMA, - RNRA, -- Self-monitoring by REG	20,000
Air Quality Management	- Minimizing dust from open area sources, including storage piles; - Dust suppression techniques should be implemented, such as applying water or non- toxic chemicals to minimize dust from vehicle movements, - Managing emissions from mobile sources, - Avoiding open burning of solid.	All ROWs	- Contractor/ REG	-REMA, -RNRA, - Self-monitoring by REG	Operational costs
Solid wastes management	- **Waste Prevention*:*** Processes should be designed and operated to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes generated - Implementation of recycling plans. - All the solid waste should be collected; the biodegradable organic material composted properly on site for manure production and the non-biodegradable disposed of in a public landfill; etc.	All ROWs	- Contractor/ REG	- REMA, - RNRA, - Self-monitoring by REG	12,000
Water Resource depletion	- Environmental conservation education to all communities living closer to water sources - Facilitation of formation and maintaining community based environmental conservation clubs. - Development of Water Resources management plan - Preparation of Climate Change adaptation measures ,	All ROWs	- REG, - REMA,	- REMA	30,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Management of Hazardous Materials and Oils	- Waste separation must be conducted on site; - Develop policies and programmes for waste management, storage, recycling and minimisation;	All ROWs	- Contractor	- REMA, - Self-monitoring by REG	20,000
Safety and Security	a) Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site; b) Measures to prevent and control OHS issues during the construction, maintenance and operation of the project should adhere to established national and international OHS guidelines that are specific for electricity distribution line projects. These measures should also have site-specific targets and an appropriate timetable for achieving them, as related to: • The Contractor should have on site an Occupational Safety and Health Policy and Action Plan addressing workers and PAPs on occupational safety and health issues, workplace conditions, welfare, accidental electrocution, hazardous waste management, general safety requirements, fire preparedness, machinery, plant and equipment, etc. in line with the Occupational Safety and Health Regulation • The Contractor should conduct HSE sensitization with PAPs directly affected by the project; • The Contractor should have HSE induction for all workers, and undertake daily tool box meetings prior to works; and • Workers should regularly be taken through safety drills and emergency preparedness training allowing for quick and efficient responses to accidents that could result in human injury or damage to the environment. c) The Contractor should involve local leaders in labour recruitment to ensure that people hired have no criminal record, to avoid hiring less desirable employees. d) The local content provision should be emphasised to minimise labour requirements needed from outside the community, as these are locally associated with safety concerns.	All ROWs	- Contractor	- REG, - District authorities	25,000
Health related issues due to dust emissions	- Use of wet processes; - Use of Personal Protective Equipment	All ROWs	Contractor/	- REMA - REG	45,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Social cohesion or disruption & Influx of people	a. The Contractor should be monitored independently and regularly to ensure strict compliance with contractual obligations, including adherence to stipulated standards of conduct and behaviour of construction workers. b. The Contractor needs to sensitise workers in cultural values and norms of the area and the identified sensitivities c. The Contractor needs to work closely with the existing law enforcement agencies in the areas of the project (Local Councils and the Police) to help address potential issues of crime in the project. Local authorities require support to handle the increased cases of indiscipline and conflict, brought about by the increased population influx, and any disputes that are likely to ensue. d. Issues of security should be handled hand-in-hand with the local Council administration, to ensure that suspicious non-known members of the area who are also not part of the project, are rounded up to avoid disrupting the security of the area. e. The project should in addition have its own security system as it is very common to find the local security organs conniving with the bad characters to exploit projects. f. A comprehensive HIV/AIDS Awareness and Management Plan must be implemented throughout and for the duration of the construction phase, with post-completion monitoring and reporting to REG and REMA, collaborating with NGOs and CBOs, as possible.	All ROWs	Contractor	- REMA REG Local authorities	12,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Human health	a) A key consideration for the proposed project is the ability to effectively involve key stakeholders in a realistic and positive participatory process to combat gender violence and the abuse and mishandling of women and children on such government infrastructure projects and the Contractor must present a plan to address such; b) A comprehensive HIV/AIDS Awareness and Management Plan must be implemented throughout and for the duration of the construction phase, with post-completion monitoring and reporting to REA and REMA, collaborating with NGOs and CBOs, as possible. c) Sensitisation of communities to be conducted and include electromagnetic fields, accidental electrocution, exposure to hazardous waste materials like fuels, oils and timber offcuts with creosote and/or CCA, safe levels of exposure and related impacts, to avoid speculations	All ROWs	Contractor	REG, REMA. Local Authorities	10,000
Gender impacts	a) Conducting appropriate sensitisation on gender issues at all levels within the Project Area and creation of awareness on the responsibility of all concerned during the various phases of the project to address specific gender concerns. This should entail consultation with both women and men in the Project Area and within the construction teams. b) REG and the Contractor should ensure that: • effective gender responsive and equality activities under the proposed project are duly defined and implemented through participatory engagement; • the quantifiable and none quantifiable, gender and social mitigation measures related to direct and indirect impacts are achieved; and • a social specialist is deployed on the project to oversee among others, gender mainstreaming in the project cycle, is implemented. c) HIV/AIDS awareness campaigns must be regularly conducted for workers and local communities, as well as activities promoting access to health services, treatment and counselling.	All ROWs	Contractor / REG	REG, REMA. Local Authorities	10,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
Vulnerable groups	a) A Child Protection Plan will be developed and provided to all the Contractors and school management to discourage the Contractors from using children as labourers. In addition, Contractors will be required to avoid employing workers who are below eighteen years old. They will also be required to keep records that show the ages of their workers. b) Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 116. The existence of the hotline can be displayed throughout near the construction site and in the community at large. c) The Contractor should ensure that mechanisms for close monitoring of worker's behaviour/conduct are in place e.g. Contractor could discreetly engage the police to identify anonymous informers from among the workers to monitor and report any negative behavior by the workers including child abuse related misconduct, display a call line or suggestion box where the community can provide feedback on workers behaviour. d) REG and the Contractor should ensure that all local leaders and women/child representatives are fully oriented to the labour force related risks for children engaging in construction related activities. e) Talks with the Contractor and his workforce by relevant officials (including the police) on child protection should be encouraged and appropriately scheduled, including continuous popularisation of the child help line 116. Parents/guardians should be sensitised and held accountable for children leaving and arriving home before dark. f) Conducting appropriate sensitisation on gender issues at all levels within the Project Area and creation of awareness on the responsibility of all concerned during the various phases of the project to address specific gender concerns and especially as they relate to women. This should entail consultation with both women and men in the Project Area and within the construction teams. g) HIV/AIDS awareness campaigns for workers and local communities and activities promoting access to health services, treatment and counselling h) REG and the Contractor should ensure strict compliance with the provision of relevant safeguard policies with respect to persons with disabilities. REGEMA and the Contractor should ensure that there is full and effective participation of persons with disabilities and other vulnerable groups, like children and through representative organisations, in all phases of the	All ROWs	Contractor / REG	REG, REMA. Local Authorities	10,000

Environmental concerns	Suggested Mitigation Measures	Location	Responsible	Monitoring	Estimated cost (USD)
OPERATION PHASE					
Animal biodiversity	• To undertake regular monitoring of threatened species (birds, monkeys) of the area during operation of line.	• In forest areas and swamplands	REG in collaboration with REMA	• REMA; • Self-monitoring by REG	40,000
Vegetation control	• The ROW will require regular maintenance to control vegetation of the ROW under conductors and in substations • Maintenance operations will have to be restricted to the ROW and should not damage the surrounding vegetation. • During maintenance and ROW clearance, ensure that vegetation is cut up to a certain height that allows animals to cross on both sides. Leave in place the shrub layer • The manual or mechanical control of vegetation within the ROW must be encouraged. To undertake tree removal mechanically and not to use phytocides to control vegetation. • To sign a maintenance contract with an local association/cooperative in order to ensure mechanical	• In all the ROW and substations	• Project Establishment • Unit (PEU)	• REMA; • Self-monitoring by REG	As part of the Operation and maintenance costs
Total Costs					**401,000**

Chapter VIII: Monitoring Program

This chapter summarizes the surveillance and monitoring activities proposed in the Environmental and Social Management Plan prepared for this project. It also identifies the roles and responsibilities of stakeholders in the implementation as well as the estimated cost of the activities.

VIII. 1 Environmental Surveillance

The project promoter is responsible for environmental surveillance at the construction site. He must ensure that the Contractor implements the Environmental Management Plan, and that he prepared and rigorously implements the plans incidental thereto:

- Drainage and erosion control plan;
- Disturbed areas rehabilitation plan;
- Waste management plan;
- Emergency plan in case of spillage of contaminants;
- Fuel and other hazardous materials management plan.

To ensure compliance with environmental requirements, the Promoter will appeal to an independent environmentalist (EI) whose competence and skills in the areas of environment and natural resource preservation are established.

That surveillance will be undertaken on basis of:

- Content of reports drafted in the context of this mandate, especially in regards with guidelines for design, above-mentioned preventive and mitigation measures, as well as environmental management plans;
- Any additional environmental study that would be required for development of specific projects;
- Particular conditions contained in the documents of environmental authorization issued by the state;
- Environment protection clauses that will have to be integrated in the contract documents.

A site environmental surveillance officer (SEO) who will enforce the implementation of various prevention and mitigation measures will have to be appointed by the Contractor. That officer will have to be involved in the complete period of construction. His responsibilities and mandate will have to be subject to a clear description in the contract documents exchanged between the national environment protection agencies and the project Promoter.

An alert structure in case of accidental spillage will have to be designed by the Contractor and submitted for approval to the SEO and national environment protection agencies and emergency materials (emergency tool kit) will have to be available on site.

The environmental surveillance officer will be the main stakeholder in charge of control and implementation of environmental requirements applicable to the project. Therefore, he will:

- Attend coordination meetings with the Project promoter and the Contractor to assess the environmental compliance of its activities, and, where relevant, define

corrective measures;

- Hold sessions for awareness raising and training for workers employed at the construction site. Those sessions will present the main sensitive environmental component, environmental protection measures applicable to works, and the alert structure in case of accidental spillage of pollutants;
- Enforce the implementation of all mitigation measures and other provisions relating to environment protection, raise any derogation and enforce implementation of required corrective measures;
- Guide decision making about environment during the work progress, even during unforeseen or emergency situations.

The environmental surveillance should extend during construction phase to the quality control by the end of works.

Table 19 summarizes the activities requiring a increased surveillance, necessary parameters, measure frequencies and responsibilities.

Table 34- Parameters of environmental surveillance at the construction site

Environmental component	Project stage	Parameter	Standard	Location	Frequency	implementation	Supervision	Costs
Quality of water	Construction	pH, EC, SS, turbidity, color, NH4+, NO3-, P total, Fe, Al, DO, BOD, grease & oil, total coliforms	REMA and World Bank Standards	Campsite	Once per month during the use of campsites	Contractor	Environmental Surveillance Officer	110,000
Sound levels	Construction	Sound levels on a scale dB (A)	REMA Standards	In the equipment yard	Once per month upon request of the Environmental Surveillance Officer	Contractor	Environmental Surveillance Officer	70,000
		Sound levels on a scale dB (A)	REMA Standards	Sound level should not be higher than a distance of 15 m from the ROW limit	Upon request of the Environmental Surveillance Officer	Contractor	Environmental Surveillance Officer	
Soil erosion	Construction	Turbidity of water	REMA Directives	As identified by RSE	Before and after the rainy season	Contractor	Environmental Surveillance Officer	30,000
Tree removal (deforestation)	Construction	Monitor clearing to ensure compliance with EMP	EMP	Along the ROW and in work areas	Upon request	Contractor	Environmental Surveillance Officer	
Rehabilitation of sites disturbed by works	Construction	Control to ensure that all construction sites are progressively rehabilitated	EMP	Campsite, storage equipment yard, borrow areas, etc		Contractor	Environmental Surveillance Officer	30,000
Total								240,000

VIII.2 Environmental monitoring

In the context of the project, monitoring programs that will be developed must, in particular, highlight the following:

- Expected impacts on the edge or within protected areas and sensitive areas;
- Long-term impact (five years) of the presence of lines on avifauna: This activity may be entrusted with a national NGO committed to bird protection;
- Modification of erosion and sedimentation phenomena in the ROW and access roads;
- Success of rehabilitation of sites disturbed by works.

Monitoring after works includes:

- inspections ;
- visual observations;
- surveys;
- selection of critical environmental parameters and their regular sampling.

VIII.3 Institutional / Organizational and Responsibilities in ESMP implementation

This section sets out the institutional and organisational arrangements as well as roles and responsibilities for the implementation of the ESIA/ESMP.

Role of the Project Coordination Unit (PCU)

The PCU shall be responsible for oversight role and the implementation of mitigation measures in this ESMP and general compliance of the project with any permits, licenses and Approval Conditions and related regulations and standards on environment. The Unit will be responsible for ensuring that, the project facilities comply with the environmental and social requirements as shall be detailed in the contract documents as well as with other guiding contractual provisions and documentations.

The Role of REG

REG will be responsible for the implementation of the Project through contractors. Its Environmental Unit headed by an Environmental Specialist has the basic training and experience in environmental and social issues and can effectively coordinate and provide expert advice to contractors on how to effectively implement the required safeguards under the project. REG will be responsible for contract management in order to ensure that the contactors adhere to their contractual obligations and that there are compliant with the environmental and social standards as spelt out in their contracts. However, to augment the capacity of Unit, it is proposed some short term technical assistance to back this capacity be provided for in the project and should cover technical and equipment as well as some specialised trainings.

Role of REMA

REMA is specifically mandated by the National Environment Act as the principal agency in Rwanda and is charged with the responsibility of monitoring, supervising, and regulating all environmental management matters in the country. One of the key institutional mandates of REMA include among others ensuring the observance of proper safeguards in the

planning and execution of all development projects including those already in existence that have or are likely to have significant impact on the environment. The role of REMA will be to review and approve environmental impact assessments as well as monitoring project implementation in accordance with the provisions of the Act and the respective regulations. From the discussions, REMA has adequate technical capacity to monitor the project activities through its Department of Environment Monitoring and Compliance in addition to the District Environment Officers in the respective project areas that will be able to report any cases of noncompliance. Overall, REMA is well placed to capture both environmental and social issues either through their mandatory compliance audits or through monitoring reports by the respective District Environment Officers.

District Local Authorities

District and Local Council in project Districts will be vital in implementation of the project in terms of mobilizing political goodwill and sensitizing communities about the project as well as their District Environment Officers who will be taking care of environmental and social aspects of the project at their levels. The DEOs in the respective areas of project implementation will monitor the project to ensure mitigation measures are adequately implemented. The DEOs will also have to review all project environmental and social assessment reports and provide comments during their review to REMA before issuance of Approvals. The DEOs will also ensure that, the project activities are implemented in accordance with REMA conditions of approval. The DEOs will also attend the monthly site meetings for the project and be able to point out issues of concerns.

The local leaders

The local leaders in the project areas will have a role on matters of helping contractors access land for the project facilities set ups. They will be key in aspects of labour identification and endorsements. The local leaders will support law enforcement agencies in curbing crime during project implementation.

The Role of the Contractors

Contractors will be responsible for complying with all relevant legislation and adhere to all mitigation measures specified in the ESIA and its ESMP. REG will therefore have to ensure enforcement of mitigation measures which will be enshrined under contractual obligations. The contractors will be obliged to have resources to ensure implementation of environmental and social management obligations in the contract (this ESMP shall be part of the Contract through hiring Environmental and Social Management Specialists to operationalize the environmental and social requirements in the ESMP and supporting documentation.

Role of Supervising Consultants

The Supervising Consultants should have in their teams at least Environment and Social Management Specialist who will have overall responsibility of ensuring that, project implementation process complies with this ESMP, REMA Approval conditions as well as contract provisions. The Environmental and Social Management Specialists shall work closely with REG Environmental and Social Safeguards Team in supervising the contractor. In addition, the contractors will conduct scheduled site supervisions to monitor state of environmental compliance as documented or executed by the Contractors' Environmentalists. The Supervising Consultants will have obligation to also oversee

compliance and observation of health and safety and labor requirements alongside other cross-cutting issues in the project.

VIII.4 Institutional capacity strengthening

Capacity strengthening of institutions involved in environment management is paramount.

Concerned Districts could be strengthened in order to develop their capacities in environment management. Capacity development sessions shall be organized for Districts' staff in charge of environmental issues, which will make it possible to monitor and assess action taken.

Facilities will be given to partners that are involved in monitoring and evaluation of mitigation measures.

VIII.5 Environmental Awareness and Training Plan

Training will be mostly based on environmental laws and regulations in force in the country, but also on the best practices in terms of environmental management including:

- Tree removal;
- Watercourse and swamp protection;
- Hazardous material management;
- Waste management.

Staff in charge with environmental issues in Districts should receive training in order to strengthen their capacities and help them fulfill their role.

Training on sensitization about awareness of risks associated with construction and operation of the transmission lines will have to be organized, especially during the construction phase of the line.

Those in charge of monitoring and evaluation of mitigation measures will have to receive training in those areas.

Employees of this project should receive specific training for accident prevention and hazards precautions and procedures for the safe storage, handling, transport and use of potentially harmful materials that are relevant to each employee's job task and work area.

Training will also be given on emergency response systems and procedures including the location and proper use of emergency equipment, use of personal protective equipment, procedures for raising the alarm and notifying emergency response teams, and the proper response actions for each foreseeable emergency situation.

Daily safety and environment briefings including inspections of personal protective equipment will be conducted by relevant supervisors or shift bosses.

A safety and environmental induction will be carried out for new employees and for any person arriving on site after a break exceeding two weeks or any contractor arriving on site.

The safety induction will cover: the use of personal protective devices, dangerous areas, appropriate conduct, emergency response procedures and waste management.

The following should be part of the Environmental Awareness and Training Plan

Purpose and Scope: All employees will be required to comply with environmental protection procedures and therefore, proper training shall be given to the workers. The training program aims to ensure that project employees:

- Are aware of the environmental issues associated with the project;
- Understand their responsibilities with respect to these issues;
- Are aware of the liability potential if adequate and reasonable (due diligence) measures are not taken to protect the environment;
- Understand requirements for protection of the environment, best management practices and avoidance measures; and
- Are aware of the relevant regulations and guidelines.

Delivery: Classroom training should preferably be given before they are assigned on construction work; this can coincide with health and safety orientation. Short, follow-up sessions will be delivered on ground as required. Environmental awareness messages shall be posted in the field office(s). Indicative environmental awareness principles and topics are shown in Table below.

Table 35: Environmental Awareness Principles and Topics

Topics	Objectives
Erosion and Sediment Control	To educate project personnel on practices that can be implemented to control erosion and maintain good water quality.
Air Quality	That machine operators will be made aware of the potential effect on air quality that their machines can have and how to keep their equipment in good running order
Dangerous Goods Transportation, Storage and Handling	To educate and make all personnel aware of the harmful or dangerous substances present on-site. To educate personnel on the best methods and requirements for transporting, off-loading, installing facilities and servicing of equipment. The emphasis will be on spill prevention
Solid Waste Management	To educate and make project personnel aware on the practices permitted to dispose of wood, food and paper, sewage and special wastes
Spill Prevention	To educate project personnel on spill response procedures to protect the environment or minimize impacts from spills of hazardous materials and release of deleterious substance, including sedimentation. All personnel will be made aware of the Spill Prevention and Emergency Response plan and the location of spill prevention and cleanup equipment.
Safety Equipment	For their own sake, the construction workers should be instructed to observe safety rules. Good protective clothing (working garments), helmets, boots, gloves, etc. should be provided. Regulation must be enforced to ensure that they

	are worn at all time when working
Reporting Structure	This part of the course will inform project personnel of who to call if an environmental concern arises. Generally, an employee will inform the Government Agencies as appropriate.

Responsibility:

The Construction team including technical manager, safety officer and Environmental Inspector or their designate is responsible to deliver the training to all construction personnel.

VIII.6 General Emergency Response Measures

The operation of the proposed development will involve workers who may become ill or have accidents. In addition, disasters such as, floods and fires are real possibilities. The following measures should be implemented:

- Make prior arrangements with health care facilities such as a Health Centre in proximity to the site to deal with any medical emergencies; During construction, first aid equipment should be available at the site. A number of the permanent personnel on the site should have the skills necessary to use the equipment.

- Design a Emergency Evacuation Plan (EEP) in the event of a fire. Fire evacuation plan should be developed; this should include measures to follow exit routes. Maps of exit routes should also be made available to all guests;

- The Site Management should coordinate with mutual aid organizations/agencies such as with the local fire brigade to deal with emergencies;

- Install fire hydrants within the proposed development.

More specifically on Fire Preparedness:

The plan of emergency in case of fire or accident should be elaborated for the implementation in the case of fire outbreaks during both the construction and operations phases. This plan will consist into two parts:

- Availability of a workforce and the materials;

- An Alarm system and organization of the first aid.

The fire-fighting equipment should be available at all workshops and warehouses and should be kept permanently in good working state. The skills in the use of these fire-fighting equipment should be one of the key points during the training of the construction and operation staff. The personnel technician in charge of the maintenance and the Lodge Management should regularly check these equipments and ensure that they are always ready to be used.

A contract should be signed between the construction company and the nearest dispensary or hospital for taking care of injured staff. The insurance should be contracted for all the personnel during the construction phase and for those who will be employed in the factory during the operation phase.

VIII.7 Costs related to ESMP Implementation

VIII.7.1 Costs related to construction

Costs for environmental management plan are summarized in **Table 17**

Overall, all the measures to be implemented are costed at 208,653,000 Rwandan Francs, including administration costs at 2% and contingence costs at 10 %.

Table 36- Cost estimates (USD) for environmental impact mitigation measures

Item	Line Kirehe-Kayonza	Line Nyamagabe - Gisagara	Bugesera	Line Gatsibo-Nyagatare	Line Rurindo-Gicumbi	Total (USD)
Ecological Impacts	110,000	90,000	50,000	60,000	30,000	340,000
Social Impacts	18,000	15,000	10,000	13,000	5,000	61,000
ESMP Monitoring	80,000	70,000	60,000	20,000	10,000	240,000
Sub-total	208,000	175,000	120,000	93,000	45,000	641,000
Administration costs (2 %)	4,160	3,500	2,500	192	9000	19,352
Unforeseen expenses (10 %)	20,800	17,500	12,500	960	4500	56,260
Sub-total	232,960	196,000	135,000	94,152	58,500	
Total						**716,612**

Chapter VIII. Conclusions and Recommendations

Access to electricity is one of the primary constraints to the Rwanda economy; providing such access unlocks economic opportunity. In the context of this project, such opportunity would most likely be taken up by the service and processing industries, which can then rely on stable electricity to build a business on. The positive impacts from this project will result in local economic growth along the transport and trading routes in the concerned Districts.
The rural landscape into which the extension of the national electricity supply is proposed, hosts a agro-ecosystem that is largely rural in which continued wetland encroachment and deforestation pose as threats to ecosystem resilience.

Much of the natural vegetation in the Project Site has been transformed, with inaccessible riparian areas and pockets of remnant forest remaining in places. The proposed route crosses numerous water streams areas. No wild animals, other than a few Monkeys and bird species were observed on the site, since the land is primarily used for agriculture. The rural homestead is typically supported by crops grown for own use, cash crops and small-scale stock farming. Trading centres provide access to basic commodities, like food stuff, fuel, materials, as well as provide for a growing service sector. Maize farming, cattle farming, milk production and pig farming, are all strong components of the rural agro-economy. These activities can become more productive and strengthen the local economy, especially if agro-processing facilities become more established. It is doubtful whether the ordinary rural homestead will be able to afford grid electricity, yet as the economy grows, the affordability matter is likely to change. Social services, including health facilities, schools and other services, like the provision of water, will certainly benefit from improved access to reliable electricity.
Care should be taken when determining specific pole locations, during the final design stage, to avoid impacts to specific environmental and social features. There is overwhelming support for the project by all stakeholders, yet certain negative social impacts and cautions have also been raised, as well as ways to deal with them; as detailed in the Environmental and Social Management Plan (ESMP).
It is necessary to make sure mitigation measures are implemented continuously through on-site monitoring, reporting and intervention. Various social issues raised during stakeholder engagement, can be better managed, as detailed in ESMP. The specific negative social impacts related to vulnerable groups, like women and children, requires specific attention and exceptional implementation and management.

The next stage of the work lies in the final design of the route and pole positions, being fully cognisant of and planning around impacts to the sensitive environmental and social features identified. Details are provided in the form of a design guideline, to highlight and respond to specific sensitivities along the current route design. The proposed extension of the national grid is a tried and tested method and currently proves the most practical and cost-effective manner to deliver electricity into the rural areas of Rwanda. With growing interest and more cost-effective technology being available, the use of solar power, in cases where it is applicable, will also continue to grow. Through effective implementation of the mitigation measures, stipulated in the resulting Environmental and Social Management Plan (ESMP), the probable risks of this project can be managed and mitigated. It is critical to realise that the project must be implemented within the suggested ESMP guidelines, to avoid negative impacts related to gender inequality, gender-based violence, the abuse of children and exclusion of vulnerable groups, as well as planning around old trees and other significant environmental and social sites features. Of primary importance in the final design stage is to focus on site specific placement and in cases of route deviation from the

road reserve, holding discussions and negotiations with affected landowners. Such work is facilitated through the implementation of the Resettlement Action Plan (RAP) process for the proposed project.

Chapter IX. Recommendations

Based on the nature of the project activities, biophysical conditions of the project area and the potential negative impacts, it is imperative that the following be given serious consideration and attention in order to preserve the environment:

- Environmental monitoring programs for this project should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during construction, operation and decommissioning phases. Speedy and appropriate actions must be taken on any issues arising through the monitoring results.
- Occupational health and safety performance should be evaluated against national /or international standards.
- The developer should try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities.
- The working environment should be monitored for occupational hazards relevant to this project.
- The developer of this project is recommended to implement the environmental and social management plan proposed in this report, that will ensure environmental compliance of the operations and also to maintain high quality standards.
- REG is recommended to take in consideration issues and concerns raised during public consultation especially issues related to compensation and jobs opportunity.

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List of Appendices

Appendix 1: Stakeholders Engagement

STAKEHOLDER ENGAGEMENT

Stakeholder engagement is a vital component of the ESIA process. The consultation and engagement process focus on providing information on the proposed project in a manner that can be understood and interpreted by the relevant audience. It enables to seek comment on key issues and concerns, sourcing accurate information, identifying potential impacts and offering the opportunity for alternatives or objections to be raised by the potentially affected parties; non-governmental organizations, members of the public and other stakeholders. Consultation has also been found to develop a sense of stakeholder ownership of the project and the realization that their concerns are taken seriously, and that the issues they raise, if relevant, are addressed in the RAP.

Consultations were conducted at National, District and Local levels. Consultations were held along the entire lengths of the power lines corridors during the period of 21/03 till 14/05/2020.

However due to COVID-19 induced lockdown this activity was not done in classical way because in order to respect social distancing at some site we used telephone and other communication means such as skype call and zoom. Despite these working conditions, in collaboration with local authorities we managed to have some consultation meeting with local population where social distancing guidelines were possible

6.1. Stakeholders

Key stakeholders have been identified and initial discussions held with decision making bodies, key stakeholders, sector institutions and specialist experts were made on the very concepts and nature of the proposed project, giving emphasis on levels of public participation, role of key stakeholders and joint contributions of these actors to the success of the project. In addition, the scope of the proposed project and possible means of maximizing local communities' social, economic and environmental benefits from the project implementation were underlined. Key stakeholders identified for consultation during preparation and implementation of RAP include but not limited to the following:

At national level:

- Ministry of Environment (MoE);
- Ministry of Infrastructure (MININFRA);
- Rwanda Environment Management Authority (REMA);
- Rwanda Standards Board (RSB);
- Rwanda Development Board (RDB);
- Rwanda Land Management and Use Authority (RLMUA)
- Rwanda Utility Regulation Authority (RURA)
- Rwanda Water and Forest Authority (RWFA)

At local level:

- Local Government Officials (Districts and Sectors);

- REG District Branch managers and
- Project Affected People (PAPs).

At Community level

Consultation with few members among the PAPs

Consultation and dialogue with PAPs is important for successful resettlement and/or compensation of the affected. The meeting was conducted by team of consultants on 18th March to April 5th 2020 The consultation exercise identified PAPs who should be affected by the project and some of nearest of electricity transmission networks.

Table 37: Planning for Stakeholders' consultations

Dates of consultation	Administrative District name/Local Government	Participants category	Number of participants by gender	
			Male	Female
Central level				
21/03/2020	Ministry of Environment (MoE)	Environment & Climate Change Policy Specialist&	1	
21/03/2020	Ministry of Infrastructure (MININFRA)	Energy Economist	1	
23/03/2020	Rwanda Environment Management Authority (REMA)	Director of environmental regulation and pollution control	1	
23/03/2020	Rwanda Development Board (RDB)	EIA Specialist	1	
24/03/2020	Rwanda Standards Board (RSB)			
27/03/2020	Rwanda Land Management and Use Authority (RLMUA)	Head of Land Administration Department		1
27/03/2020	Rwanda Water and Forest Authority	Ag DG	1	
30/03/2020	Rwanda Utility Regulation Authority (RURA)	Director of electricity and Renewable Energy	1	
Local level				
01/04/2020	Gicumbi	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	27	5

Dates of consultation	Administrative District name/Local Government	Participants category	Number of participants by gender	
			Male	Female
01/04/2020	Rulindo	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	26	8
02/04/2020	Bugesera	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	7	2
05/04/2020	Kayonza	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	11	1
07/04/2020	Ngoma	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	21	9
09/04/2020	Nyagatare	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	7	0
10/04/2020	Gatsibo	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	9	4
12/04/2020	Kirehe	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	8	1
15/04/2020	Nyamagabe	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	13	2
17/04/2020	Huye	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	13	2
19/04/2020	Gisagara	Districts officials, Sector Executive Secretaries, SLM and Local Community, EARP Team, EUCL District Branch Manager	9	3

Table 38: List of interviewed persons (local authorities / officers of governmental institutions at decentralized level and communities members)

Date	Names	Function	Institution	Tel
24/03/2020	SABATO Theoneste	Chief of Village	Local Government	0785392614
24/03/2020	MUVANDIMWE Laurent MBONIGABA	Executive secretary of Sector/RUKIRA sector	Local Government	0788756653
24/03/2020	NYIRANTIBUNVA Donattha	Executive secretary of cell/Nyinya	Local Government	0735840596
25/03/2020	NDIHOKUBWAYO Ethienne	Executive secretary of cell/Kibatsi	Local Government	0738508990
25/03/2020	SEMINEGA	Executive secretary of cell/RUBIMBA	Local Government	0789006674
25/03/2020	SEMUGISHA BERWA Diogene	Executive secretary of Sector/Kabare sector	Local Government	0784224844
25/03/2020	RUBERANKIKO Prosper	Chief of village	Local Government	0782247146
25/03/2020	HITIMANA Joseph	Executive secretary of cell/Gitara	Local Government	
25/03/2020	SENDEGEYA Etienne	RUKARARA Substation Operator	EUCL/REG	0786390497
28/03/2020	Lambert BIKORIMANA	In Charge of District infrastructure Management/ GISAGARA DISTRICT	Local Government	0788793824
23/03/2020	NKUBITO Gildas	In Charge of District Infrastructure Management/ Nyamagabe District	Local Government	0788477675
20/03/2020	MUSAFIRI Jean Pierre	In charge of Land use and Infrastructure at District/ Huye District	Local Government	0788440182
30/03/2020	Jerome RUTABURINGOGA	Mayor/ GISAGARA District	Local Government	0788612293
21/03/2020	MVUYEKURE Pascal	Chef of Village/Kigarama	Local Government	0785160484
21/03/2020	NGENDAHIMANA Emmanuel	Chef of Cell/Bwama	Local Government	0782636064
25/03/2020	Bonaventure UWAMAHORO	Mayor/Nyamagabe District	Local Government	0788639429
30/03/2020	Gaudance NYIRAHAVUGIMANA	Mayor Assistant/Gisagara District	Local Government	0785344506
29/03/2020	David MUHIRE NTIYAMIRA	Executive Secretary/Gisagara-Save Sector	Local Government	0788463031
29/03/2020	Solange MUMARARUNGU	Executive Secretary/Gisagara-Ndora Sector	Local government	0788681612
23/03/2020	UWIMABERA Clemence	Executive Secretary/Huye-Mbazi Sector	Local Government	0786830071
23/03/2020	MUTSINDASHYAKA Alphonse	Executive Secretary/Huye-Ngoma Sector	Local Government	078683004

Date	Names	Function	Institution	Tel
23/03/2020	RWAMUCYO Prosper	Executive Secretary/Huye-Huye Sector	Local government	0784833949
24/03/2020	Jean Christophe RWABUHIHI	Executive Secretary-Sector	Local Government	
27/03/2020	KANANGA Jean Damascene	Land Center Officer-Bugesera District	Local Government	
27/03/2020	MUTABAZI Richard	Mayor-Bugesera District	Local Government	
27/03/2020	MUDASINGWA Alex	REG Branch Manager-Bugesera District	REG	
25/03/2020	MUKAMANA Hadidja	Social Affaires-Ramiro Cell	Local Government	
2 april, 2020	Mutuyimana Appolinaire	Executive secretary/ Murama Sector	Local Government	0784233756
2 april, 2020	Bizimana Claude	Executive secretary/ Rwinkwavu Sector	Local Government	0784233755

Table 39: List of interviewed (PAPs)

Date	Names	Function	Institution	Tel
24/03/2020	SHIRIMPAKA Felicien	Farmer	Local Resident	0783747656
24/03/2020	UZABAKIRIHO J.M. V	Farmer	Local Resident	0780371297
24/03/2020	TWAGIRAYEZU Elezaus	Farmer	Local Resident	0789698850
24/03/2020	NIYONSABA Isaie	Farmer	Local Resident	0783327980
24/03/2020	RUGIRANYIRAZO Sylvain	Farmer	Local Resident	0784475704
25/03/2020	HABANABAKIZE Thomas	Farmer	Local Resident	0784765637
25/03/2020	TUYISHIMIRE Jeanvier	Farmer	Local Resident	0734643546
25/03/2020	MUGABO Alphonse	Farmer	Local Resident	0785024141
25/03/2020	NIRAGIRE Francine	Farmer	Local Resident	0784256735
25/03/2020	RUTAYISIRE	Farmer	Local Resident	0786765711
25/03/2020	MUHAWENIMANA Joselyne	Farmer	Local Resident	0780190083
26/03/2020	NDAYISENGA Jean Baptiste	Farmer	Local Resident	0784627835
26/03/2020	NSEKANABO Vincent	Farmer	Local Resident	0788831736
26/03/2020	RUBONEKA Isaac	Farmer	Local Resident	0783138295
26/03/2020	Mbarubukeye Aphrodise	Farmer	Local Resident	0782359590
26/03/2020	MUSABYEMARIYA Penelope	Farmer	Local Resident	0783278620
26/03/2020	NDAGIJIMANA Pierre	Farmer	Local Resident	0786403633
27/03/2020	HAKIZAMUNGU Saidi	Farmer	Local Resident	0785051833
27/03/2020	GAKWERERE Tharcisse	Farmer	Local Resident	0785181578
27/03/2020	NZAYISENGA Emmanuel	Farmer	Local Resident	0789914547
27/03/2020	BIMENYIMANA Emmanuel	Farmer	Local Resident	0786547540
27/03/2020	NIYIMBONEZA Aloys	Farmer	Local Resident	0784185550
27/03/2020	NTAWUVUGURUZIMANA Jean D'Amour	Farmer	Local Resident	0782735640
27/03/2020	HATEGEKIMANA Eliazar	Farmer	Local Resident	0789453816

Date	Names	Function	Institution	Tel
27/03/2020	HABIMANA Amiel	Farmer	Local Resident	0787225985
27/03/2020	SIKUBWABO Joseph	Farmer	Local Resident	0785337099
28/03/2020	NAYINO Suzana	Farmer	Local Resident	0784989467
28/03/2020	NSABIYEBOSE DJuma	Farmer	Local Resident	0787331511
28/03/2020	RUTAYOMBA Habib	Farmer	Local Resident	0780284499
28/03/2020	MBARIYINEZA Theogene	Farmer	Local Resident	0732515355
28/03/2020	KAREKEZI Justin	Farmer	Local Resident	0789468866
29/03/2020	KAREGEYA Leopord	Farmer	Local Resident	0786859595
29/03/2020	BIMENYIMANA Emmanuel	Farmer	Local Resident	0783288091
29/03/2020	MANIRAHO Faustin	Farmer	Local Resident	0784170947
29/03/2020	NKOMEJE Landouard	Farmer	Local Resident	0784630787
29/03/2020	NGABONZIZA Francois	Farmer	Local Resident	0783029506
30/03/2020	HABIMANA Vedaste	Farmer	Local Resident	0782220435
30/03/2020	BIHIBINDI Michel	Farmer	Local Resident	0782220435
30/03/2020	NDIHOKUBWAYO Jean Damascene	Farmer	Local Resident	0784343996
30/03/2020	MUHIRE Jean Claude	Farmer	Local Resident	0789492450
30/03/2020	HABUMUREMYI Jean Damascene	Farmer	Local Resident	0780337294
30/03/2020	RUKEMAMPUNZI Vital	Farmer	Local Resident	0789182819
31/03/2020	NGAYABAMWANGA Xavier	Farmer	Local Resident	0789747406
31/03/2020	NSHUMBUSHO Frank	Farmer	Local Resident	0786187969
31/03/2020	MUKANGARUYE Angelique	Farmer	Local Resident	0782927426
31/03/2020	BAZITABOSE Emmanuel	Farmer	Local Resident	0789182819
31/03/2020	UZAMUKUNDA Pascasie	Farmer	Local Resident	0789893437
31/03/2020	BIZIMUNGU Naphtar	Farmer	Local Resident	0783625096
31/03/2020	MUHIRWA Jean Damascene	Farmer	Local Resident	0783320098
01/04/2020	MBARUBUCYEYE Arstide	Farmer	Local Resident	0787883065
01/04/2020	NYIRANEZA Eli marine	Farmer	Local Resident	0783580091
01/04/2020	TURINABO Pierre Celestin	Farmer	Local Resident	0788405538
01/04/2020	SHIRIMPAKA Fulgence	Farmer	Local Resident	0788432770
02/04/202	UWINEZA Beatha	Farmer	Local Resident	0788530737
02/04/202	MUKAMANA Jacqueline	Farmer	Local Resident	0782770224
02/04/202	NSABIMANA Cyprien	Farmer	Local Resident	0781926547
02/04/202	BABUZE Frederick	Farmer	Local Resident	0783268774
02/04/202	BIKORIMANA Celestin	Farmer	Local Resident	0788656033
28/03/2020	HATEGEKIMANA Jean de Dieu	Farmer	Local Resident	0725364033
28/03/2020	MUNYANKINDI Jean Claude	Farmer	Local Resident	0724518949
21/03/2020	MUKANDAMUTSA Lucie	Farmer	Local Resident	0785390333
20/03/2020	TWIZEYEMUNGU Gervais	Farmer	Local Resident	0726659188
24/03/2020	BANZIMWABO Ildephonse	Farmer	Local Resident	
25/03/2020	MUNYEMANA Evariste	Farmer	Local Resident	
26/03/2020	SEBAHINZI Anastase	Farmer	Local Resident	
26/03/2020	IRADUKUNDA Candide	Farmer	Local Resident	
26/03/2020	NSABIMANA Damascene	Farmer	Local Resident	

Date	Names	Function	Institution	Tel
24/03/2020	Hererimana Daniel	Farmer	Local Resident	0787587455
24/03/2020	Karera Augustin	Farmer	Local Resident	0788662858
24/03/2020	Uwubumwe Innocent	Farmer	Local Resident	0785800241
02/04/2020	Bazatsinda Thacien	Farmer	Local Resident	
02/04/2020	Ruvubi Thacien	Farmer	Local Resident	0788758885
02/04/2020	Nyirandorimana Alphonsine	Farmer	Local Resident	

Summary of public consultations and the opinions expressed

Table 40- Summary of concerns and issues rose during consultations in different districts of the project

Environmental Components	Major issues and concerns expressed
Perceptions and awareness of the public, in relation to the proposed project.	Consulted Communities in the project area were not aware of the project, but they agree and acknowledge the excellent/considerable importance of the project.
Land and soil protection issues	It was pointed that the land system is particularly dominated by customary law and therefore encourages land parcelling and land disputes. For the case of Rwanda, land disputes are multiple and varied. Some result from the morphological and physiological nature of land while others are socio-demographic and socio-economic. The major concerns expressed are related to increase of erosion on watersheds, particularly on marginal or rugged lands The law on expropriation in the public interest no. 18/2007 of 19 April 2007 should be applied and it provides under Article 2 paragraph 2 fair compensation: compensation equivalent to the value of land and developments will be paid to the expropriated people and calculated by applying the market price. An additional and independent expertise is deemed useful for calculation of compensation and avoidance of land disputes. Given that land is not sufficient, concerns were focused on increase in land parcelling. Fragmented lands loose their value and, at that time, they would like to take into account all lands of a household whose area of plots in the ROW is higher than that of residual lands.
Degradation of woody savannah's biodiversity	More particularly authorities in charge with natural forest management and the Rwandese Association for Conservation of Nature expressed those concerns. Those savannah are respectively located in Gatsibo, Bugesera and Kirehe Districts. Those savannah are habitats for flora and wildlife, among which mammals and reptiles as well as endemic butterflies and a large diversity of birds. Those ecosystems are already under various threats, such as wood harvesting, bushfires, clearing in search of new farming land, settlement of habitat, search for pasture land and animal poaching.
Wetland and water resource protection	It was pointed that the land system is particularly dominated by customary law and therefore encourages land parcelling and land disputes. For the case of Rwanda, land disputes are multiple and varied. Some result from the morphological and physiological nature of land while others are socio-demographic and socio-economic. The major concerns expressed are related to increase of erosion on watersheds, particularly on marginal or rugged lands. With erosion, there is sedimentation that could reach ponds and wetlands located downstream. The risk for destruction of soil protection structures (erosion control ditches, radical terracing) put in place was cited, but also increase of land disputes during valuation for expropriation and compensation. Given that land is not sufficient, concerns were focused on increase in land parcelling. Fragmented lands loose their value and, at that time, they would like to take into account all lands of a household whose area of plots in the ROW is higher than that of residual

Environmental Components	Major issues and concerns expressed
	lands.
Hardly accessible zones with steep slopes	The issue raised relates to tower installation in hardly accessible zones with steep slopes. For those areas, there was fear of downstream accidents related to landslides but also fall of stones removed from the rock. It was suggested to avoid access of heavy machinery to steep zones and make sure landslides are avoided, and check that the downstream part is not inhabited in order to provide for a warning system for the population.
Information about the project	Most authorities, especially, local authorities, were not informed about the project. At the end of discussions, they pledged their support, and found the project to be the solution for the issues of frequent power faillures following insufficiency of electric power. It is also for them hope to operationalize planned projects related to rural development and fulfil their promises to the population in regards with grouped settlements. They requested strengthening of environmental protection measures and their involvement in monitoring the implementation of adverse impact mitigation measures.The population from the communities who were consulted manifested their full support to the project on condition that it would first allow rural connections. Thus, the project will enable them to be relieved of isolation and darkness.
Job opportunities	In the framework of poverty reduction, the government supports labor-intensive initiatives and projects. All the authorities had wished that this project could contribute to job creation in rural areas and increase the population's purchasing power, and lighten the poverty effects. Environmental impact mitigation projects would contribute to enhancing the population's purchasing power in a sustainable way, but also to environmental education and natural resource protection in a sustainable manner in the project's catchment area
Environmental education for the population	Consulted authorities showed their satisfaction with the project for environmental education opportunities for all the environment components. The project would be a major asset for educating the population on environmental protection programs given that at each district and sector, there is one person in charge of environment.

Consulted authorities showed their satisfaction with the project for environmental education opportunities for all the environment components. The project would be a major asset for educating the population on environmental protection programs given that at each district and sector, there is one person in charge of environment.

Appendix 2: Vegetation types crossed by the individual lines (Estimated Area per ROW)

District	Vegetation type	Extent (Ha)	Percentage of on entire ROW	Total (Ha)
Rwinkwavu – Kirehe				
Kirehe	Banana	2.8750	35.9375	21.0750
	Forest	3	51.6129032	
	Coffee	1.1500	40.6001765	
	Others	14.0500	33.7943476	
Ngoma	Banana	3.6250	45.3125	18.6500
	Forest	2.1250	36.5591398	
	Coffee	0.9500	33.5392763	
	Others	11.9500	28.7432351	
Kayonza	Banana	1.5000	18.75	18.4950
	Forest	0.6875	11.7773019	
	Coffee	0.7325	25.8605472	
	Others	15.5750	37.4624173	
	Mixed Crops (beans, maize, sorghums)	6.325 ha	31.4%	
	Banana plantation	1.8625 ha	9,2%	
	Natural trees, glasses and eucalyptus forest	9.3375 ha	46.3%	
	Coffee plantation	0.6125 ha	3%	
	Cassava and or sweet potatoes plantation	2 ha	9,9%	
Total				**58.2200**
Rukarara – Huye – Gisagara				
Nyamagabe	Banana	3.00	2.61	42.64
	Forest	14.87	12.93	
	Soja+ Beans +Sorghum	9.86	8.58	
	Coffee	11.16	9.70	
	Others	3.75	3.26	
Huye	Banana	9.75	8.48	47.70
	Forest	6.56	5.71	
	Soja+ Beans +Sorghum	19.58	17.02	
	Coffee	7.13	6.20	
	Others	4.69	4.08	
GISAGARA	Banana	4.50	3.91	21.83
	Forest	5.44	4.73	
	Soja+ Beans +Sorghum	6.56	5.71	
	Coffee	3.92	3.41	

	Others	1.41	1.22	
Sub- Total				**112.16**
Gabiro-Nyagatare				
Nyagatare	Mixed Crops (beans, maize, sorghums)	13.6275 ha	50.4%	27,02 ha
	Banana plantation	2.64 ha	9.7%	
	Natural trees and glasses (known as firms for cows)	10.7525 ha	39.7%	
Sub Total				**27.02**
Bugesera				
Bugesera	Banana	1.65	6.05%	**19**
	Forest	6.71	24.76%	
	Coffee	2.15	43.32%	
	Others	8.50	31.43%	

Appendix 3: Matrix for Risk Management for the construction of 110kv lines and substations project

Code	Impacted Aspect	Impact / Description of the risk	Positive/ Negative/ Neutral Impact	Magnitude (M/I)	Extent (E)	Duration (D)	Reversibility (R)	Consequence (C)	Probability (P)	SIGNIFICANCE (S)	Mitigation
	PRE-CONSTRUCTION PHASE										
	ACTIVITY 1-2: Project Design, planning and land acquisition, Feasibility study										
	Quality of life	Loss of land and resettlement	Negative	4	1	5	3	13	4	42	Y
		Job creation	Positive	2	3	1	1	7	4	28	N
	ELECTRICITY INFRASTRUCTURE DEVELOPMENT PHASE										
	ACTIVITY 3: Site installation and transport of material onsite										
	Geology	Alteration of the geology	Negative	1	1	2	3	7	3	21	Y
	Soil	Risk of soil erosion	Negative	1	1	1	1	4	4	16	Y
	Surface water	Risk of surface water pollution	Negative	2	2	1	1	6	4	24	Y
	Ground water	Risk of ground water pollution	Negative	1	1	1	1	4	3	12	Y
	Air quality	Risk of dust generation and emission	Negative	2	1	1	1	5	4	20	Y
	Noise	Increase of noise levels	Negative	1	2	1	1	5	4	20	Y
	Flora and Fauna	Adversely affect local fauna and flora	Negative	4	1	1	5	11	4	44	Y
	Quality of life	Jobs creation	Positive	3	2	1	3	9	4	36	N
		Risk of accidents	Negative	2	1	1	3	7	3	21	Y
	ACTIVITY 4: Construction of 110kv lines projects										

Impacted Aspect	Impact	Positive/ Negative/ Neutral Impact	Magnitude (M/I)	Extent (E)	Duration (D)	Reversibility (R)	Consequence (C)	Probability (P)	SIGNIFICANCE (S)	Mitigation
Soil	Risk of alteration of geological formation and Risk of soil erosion	Negative	1	1	2	2	6	3	18	Y
Air quality	Risk of dust generation and emission	Negative	2	2	1	3	8	4	32	Y
Flora and fauna	Adversely affect local fauna and flora	Negative	3	1	2	3	9	4	36	Y
Quality of life	Health effects	Negative	5	2	3	3	13	3	39	Y
	Improvement of quality of life	Positive	4	2	3	3	12	4	48	Y
	Education and Employment	Positive	4	2	3	3	12	4	48	Y
Activities 5: Construction and installation of 110kv substations projects										
Soil	Risk of soil erosion	Negative	1	1	2	3	7	3	21	Y
Surface water	Risk of surface water pollution	Negative	2	2	1	3	8	3	24	Y
Ground water	Risk of ground water pollution	Negative	1	1	1	1	4	3	12	Y
Air quality	Risk of dust generation and emission	Negative	2	2	1	3	8	4	32	Y
Noise	Increase of noise levels	Negative	3	2	2	3	10	4	40	Y
Flora and fauna	Adversely affect local fauna and flora	Negative	3	1	2	3	9	4	36	Y
Quality of life	Health effects	Negative	3	2	2	5	12	4	48	Y
	Job creation	Positive	4	4	2	3	13	4	52	N
Activities 6 and 7 **Civil works** **Disposal of construction wastes**										

Impacted Aspect	Impact	Positive/ Negative/ Neutral Impact	Magnitude (M/I)	Extent (E)	Duration (D)	Reversibility (R)	Consequence (C)	Probability (P)	SIGNIFICANCE (S)	Mitigation
Soil	Soil compaction	Negative	4	1	3	3	11	3	33	Y
Surface water	Risk of surface water pollution	Negative	5	2	5	3	15	5	75	Y
Ground water	Risk of ground water pollution	Negative	2	1	3	1	7	2	14	Y
Air quality	Risk of dust generation and emission	Negative	4	2	3	3	12	4	48	Y
Noise	Increase of noise levels	Negative	3	2	3	1	9	3	27	Y
Quality of life	Employment	Positive	5	4	3	3	15	5	75	N
	Risk of accidents	Negative	3	1	3	5	12	3	36	Y
	Health effects	Negative	3	2	3	5	13	4	52	Y
ACTIVITY 8: Influx of construction workers										
Quality of life	Risk of social conflict with local communities	Negative	3	1	2	1	7	2	14	Y
	Health effects	Negative	3	2	4	3	12	3	36	Y
	Income generation	Positive	3	2	2	3	10	3	30	N
Electricity Infrastructure operation and maintenance phase										
ACTIVITY 9: Electricity transmission										
Quality of life	Employment	Positive	4	4	3	3	14	3	52	N
	Risk of accidents	Negative	3	1	3	3	10	3	30	Y
	Health and Education effects	Positive	3	2	4	3	12	3	36	N
ACTIVITY 10 & 11:										

Impacted Aspect	Impact	Positive/ Negative/ Neutral Impact	Magnitude (M/I)	Extent (E)	Duration (D)	Reversibility (R)	Consequence (C)	Probability (P)	SIGNIFICANCE (S)	Mitigation
Maintenance and rehabilitation of water infrastructure **Ensure that the measures provided for emergency and safety are proper and adequate**										
Surface water	Risk of surface water pollution	Negative	1	2	1	1	5	3	15	Y
Ground water	Risk of ground water pollution	Negative	1	1	1	1	4	2	8	Y
Air quality	Risk of dust generation and emission	Negative	1	2	1	1	5	3	15	Y
Noise	Increase of noise levels	Negative	2	2	1	1	6	2	12	Y
Flora and fauna	Adversely affect fauna and flora	Negative	1	1	1	3	6	2	12	Y
Quality of life	Employment	Positive	3	4	1	3	11	4	44	N
	Risk of accidents	Negative	2	2	1	5	10	3	30	Y
	Health effects	Negative	2	2	1	5	10	3	30	Y
Infrastructures	Rehabilitation and maintenance of infrastructure	Positive	4	1	1	3	9	4	36	N
DECOMMISSIONING/CLOSURE AND POST-CLOSURE PHASE										
ACTIVITY 12: Project Closure										
Soil	Soil contamination	Negative	2	1	2	3	8	2	16	Y
Surface and ground water	Risk of surface and ground water pollution	Negative	2	2	2	3	9	2	18	Y
Noise	Increase of noise levels	Negative	2	2	2	3	9	2	18	Y
Visual	Improvement of the beauty of the area	Positive	3	2	4	3	12	3	36	N

Impacted Aspect	Impact	Positive/ Negative/ Neutral Impact	Magnitude (MI)	Extent (E)	Duration (D)	Reversibility (R)	Consequence (C)	Probability (P)	SIGNIFICANCE (S)	Mitigation
Public safety	Risk of accidents	Negative	2	1	2	5	10	2	20	Y
ACTIVITY 13: Land reclamation and revegetation										
Soil	Soil structure and texture improvement	Positive	4	1	3	1	9	3	27	N
Flora and Fauna	Vegetation cover and proliferation of fauna habitats	Positive	4	2	3	1	10	4	40	N
Surface and groundwater	Improvement of surface and ground water quality	Positive	3	2	2	3	10	3	30	N
Land use	Availability of land for agriculture	Positive	4	2	3	1	10	3	30	N
Quality of life	Job creation	Positive	3	2	2	3	10	3	30	N

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