ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR DESIGN, SUPPLY, AND INSTALLATION OF LOW AND MEDIUM VOLTAGE LINES, DISTRIBUTION OF TRANSFORMERS FOR DISTRIBUTION NETWORK STRENGTHENING AND UPGRADING THE SINGLE-PHASE LINES TO THREE PHASES IN THE NORTHENPROVINCE OF RWANDA

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EXECUTIVE SUMMARY

Rwanda is experiencing significant socio-economic development, and it is crucial to have facilities that can support the country's ambitions. In this context, the Government is making efforts to improve infrastructure facilities, including ensuring a sustainable supply of electricity in both urban and rural areas to achieve 100% access to electricity nationwide by the year 2024. This initiative is outlined in the National Strategy for Transformation (NST1) for 2017–2024.

The Government of Rwanda (GoR) has also shown its ability to carry out large-scale investment programs by pooling funds from various development partners using a 'Sector Wide Approach', particularly in the energy sector. As part of this effort, the Government of Rwanda, in collaboration with multiple development partners (MDPs), initiated Accelerating Sustainable and Clean Energy Access Transformation (ASCENT), under the Rwanda Universal Energy Access Program (RUEAP). The Program Development Objective aims to enhance access to energy and improve the efficiency of energy service delivery to households, businesses, and public institutions in Rwanda.

In this regard, Rwanda Energy Group (REG) through its subsidiary Energy Development Corporation Limited (EDCL) has appointed the Bureau for Engineering and Environmental Studies (BESST Ltd) to conduct an Environmental and Social Impact Assessment study related to the project design, supply and installation of new MV and LV lines; design, supply and installation of distribution transformer for distribution network reinforcement; and upgrading the single lines to three phases lines in the Northen Province.

Project location
The ASCENT will be implemented throughout the country with the aim to improve the rate of access to electricity supply countrywide. This ESIA is for the southern province covering all 7 districts of Northen province namely Musanze, Burera, Gakenke, Rulindo, Burera and Gicumbi. Even though the project is entirely described, this ESIA scope was only for the above Districts and focussing mainly on the distribution and access projects.

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

Sub Project activities
The project activities will consist mainly of 3 complementary scopes: Design, supply and installation of new MV and LV lines; design, supply, installation and distribution of transformers for distribution network reinforcement; and upgrading the single lines to three phases lines. Specific activities are as follow:

- Construction of MV and LV electrical lines
- Erection of distribution transformers for network reinforcement
- Upgrading of identified single phases lines to three phases lines;
- Clearing of the line's right-of-way;
- Excavation works and other earthmoving and poles erection;
- Transportation of project materials
- Cable stringing;
- Lines energizing;
- Lines Commissioning;
- Maintenance including the clearing of the right-of-way during the operation phase.

Project alternatives
The identification of project alternatives includes the consideration of the project developer's 'preferred option', as detailed in the preliminary route design and drawings the environmental and social considerations to ensure anticipated impacts are avoided and eliminated, easy access to facilitate the transportation of project materials etc. Other project alternatives identified included:

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:

- No project option
- Overhead power lines consideration
- Underground power lines consideration
- Alternatives sources of energy generation and
- Construction methods
- Offsetting or Compensation of the losses generated by the sub-project

Legal, regulatory and institution framework

The project implementation is intended to be implemented in full compliance with both national and international regulations related to environmental and social standards. At the national level, environmental regulations start with the Constitution of the Republic of Rwanda which articulates the rights and responsibilities of all citizens and the role of the state in environmental protection. The constitution also recognizes ownership of property and in case the right is taking procedure of public interest, procedures are determined by the law and subject to prior and fair compensation. Other key national policies, laws, orders and strategies relevant to the project include those related to environmental management and protection, land use and management only to mention some. The international treaties and conventions as signed and rectified by the GoR applicable to the project were also consulted as detailed in this report. Mainly the WB Environmental and Social Standards (ESS) applied to the project were consulted. The WB ESS applied to the project are:

ESS1: Assessment and Management of Environmental and Social Risks and Impacts;
ESS2: Labor and Working Conditions;
ESS3: Resource Efficiency and Pollution Prevention and Management;
ESS4: Community Health and Safety;
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
ESS8: Cultural Heritage;
ESS10: Stakeholder Engagement and Information Disclosure.

Positive Impacts

Regarding the social impacts, the study identified that positive social impacts would result from the new (or improved) electricity supply, which allows economic development and improvements in living conditions. The positive social and environmental impacts of during the planning phase are:

- Temporary job opportunities for those who will be working for the project including line surveyors
- Income generation
- Knowledge transfer among them who will be recruited wo works with expert

The positive social and environmental impacts of during the construction phase are:

- Temporally job opportunities to project workers
- Income generation
- the creation of financial income because of the temporary jobs that will be created for local workers;
- the creation of financial income for local traders selling food items along the construction sites
- knowledge transfer

The positive social and environmental impacts of during the operation phase are:

- Improvement of the living conditions of households and public institutions to be connected due to easy 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.
- There will also be improvement in study conditions for students and school children, following the electrification of schools within the villages concerned.
- There will be better functioning conditions in health centers and pharmacies, thus enhancing patient care.
- The creation of new trading opportunities for men and women in the artisanal sector (welding, hairdressing, catering);

- Development of commercial activities in project-targeted areas
- The possibilities of an electricity supply project are linked to poverty reduction and can be seen in an increased income, enhanced productivity, and improved quality of life.

The positive social and environmental impacts of during the decommissioning phase are:
- Job opportunities
- Income generation

Negative Impacts

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

- Resettlement and other associated negative impacts
- Loss of trees and crops resulting into loss of income and livelihood
- Construction works will have impacts on the soils, water and ambient air
- Risk of HIV/AIDS GBV, sexual exploitation and abuse and sexual harassment among workers and nearby communities, as a result of labour influx.
- The risk of accidents during clearing and excavation works and other installations of equipment and stringing of power lines.
- Risk of accidents by electrocution during the operation phase.
- Health risks for the population due to the electromagnetic field of power lines and transformers. However, this risk is minimal in the case of medium-voltage lines.
- Impacts from waste generated.
- Impact related to GBV
- Habitat destruction
- Potential bird kills from electrocution.
- Noise generation at the constriction sites
- Traffic flow interference
- Soil and water pollution
- Labour issues for other specific projects
- Impacts on Physical Cultural Resources either tangible cultural heritage or intangible cultural resources, such as llanguage, poetry, music, dance and intellectual knowledge.
- Resettlement impacts as this project will have to compensate for the crops and trees within the RoW.

Mitigation measures

Mitigation measures for each of the adverse impacts anticipated were proposed to an extent that they can be avoided, reduced, limited or eliminated, and manageable. Furthermore**,** an Environmental and Social Management Plan and an Environmental Monitoring Plan indicating the mitigation measures, the procedure to be followed, monitoring indicators, the responsible institutions and likely cost of implementing each of these mitigation measures have all been detailed in this report.

Land use restrictions is expected within the RoW and will be carried out in accordance with the prevalent laws of Rwanda, The WB ESS guidelines on Land Acquisition, Restrictions on Land Use and Involuntary Resettlement (ESS5), 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. For this specific project, no land acquisition is planned. The location of transformers will be road reserves and public spaces. For line routes, land owners shall be able to continue to use the land with some restrictions on land use like construction of the houses under electrical lines, planting trees beyond 3 meters, etc as per RURA Guidelines. Fair compensation will be ensured for crops and trees to be affected by the project activities. To some extent, some houses and structures may be affected, and these will be relocated accordingly. Where applicable, compensation would be paid before the start of works. Another method to mitigate the impact of land restriction by the project is to allow the continuation of agriculture within the ROW on conditional terms and in compliance with strict vegetation management guidelines. As part of the livelihood restauration, PAPs will be guaranteed jobs during the project implementation.

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 mitigations are synthesized and presented as a final set of mitigation

measures in the Environmental and Social Management Plan (ESMP).

Implementation and Monitoring arrangement

REG/EDCL is the lead agency in the implementation of the developed ESMP and the overall project monitoring. Its main role will be to implement the recommended mitigation measures for each impact identified. Contractors of the project will also work hand in hand with the districts to implement the provided impact mitigation measures. An Environmental and Social safeguard team under EDCL is assigned to formally address environmental and social issues on a routine basis and will have oversight of environmental and social aspects of the construction contracts, including the enforcement of all monitoring provisions, the location of temporary storage sites for poles and other materials, the resolution of any complaint arising from PAPs, etc.

Conclusion

Given the nature, location and, planned project works, the consultant has identified impacts pertaining to the project and has recommended their mitigation measures with a detailed Environmental and Social Management Plan (ESMP) that provides a way forward for their implementation. Project benefits are found to be far outweighed the negative impacts and for which a mitigation plan has been prepared. To this extent, the consultant is the view that the project be implemented with careful implementation of proposed measures.

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ACRONYMS

BESST	**:** Bureau for Engineering and Environmental Studies
7YGP	**:** 7-Year Government Program
AfDB	**:** African Development Bank
CO2	**:** Carbon Dioxide
EDCL	**:** Energy Development Corporation Limited
EIA	**:** Environmental Impact Assessment
ESIA	: Environmental and Social Impact Assessment
ESMP	: Environmental and Social Management Plan
ESS	: Environmental and Social Standards
ESSP	: Energy Sector Strategic Plan
GOR	**:** Government of Rwanda
ICT	**:** Information & Communication Technology
LV	: Low Voltage
MININFRA	: Ministry of Infrastructure
MoE	**:** Ministry of Environment
MV	**:** Medium Voltage
MW	**:** Mega Watts
NGOs	: Non-Governmental Organizations
NST1	: National Transformation Strategy – Phase 1
OS	: Operational Standards
RDB	: Rwanda Development Board
REG	: Rwanda Energy Group
REMA	: Rwanda Environment Management Authority
RoW	**:** Right-of-Way
RUEP	: Rwanda Universal Energy Access Program
RURA	**:** Rwanda Utility Regulatory Agency
SDGs	: Sustainable Development Goals

1. INTRODUCTION

Rwanda is undergoing significant socio-economic development, and it is imperative to have facilities that can support the country's ambitions. In this framework, the Government is making effort to increase infrastructure facilities including the sustainable supply of electricity in both urban and rural areas with the target of achieving a 100% access to electricity by the year 2024 countrywide. This is recognized under the National Strategy for Transformation (NST1) for 2017–2024. The NST1 aims to lay the foundation for achieving upper-middle-income country status by 2035 and high-income status by 2050. It is guided by the Sustainable Development Goals (SDGs), the Africa Union Agenda 2063 and its first 10-Year Implementation Plan 2014–2023, and the East African Community (EAC) Vision 2050.

The strategy lays out targets under the three pillars of economic transformation, social transformation, and transformational governance, and several cross-cutting areas. Under the social transformation pillar, NST1 aims to achieve universal electricity access by the end of the seven-year period. The Government of Rwanda (GoR) has also demonstrated its ability to implement large-scale investment programs that pool funds from multiple development partners under a 'Sector Wide Approach', including in the energy sector. To achieve the above objective, the Government of Rwanda in collaboration with multi-Donor partners (MDPs) designed the Rwanda Universal Energy Access Program (RUEAP) which has the main objective of improving access to energy and efficiency of energy service delivery to households, businesses, and public institutions in Rwanda.

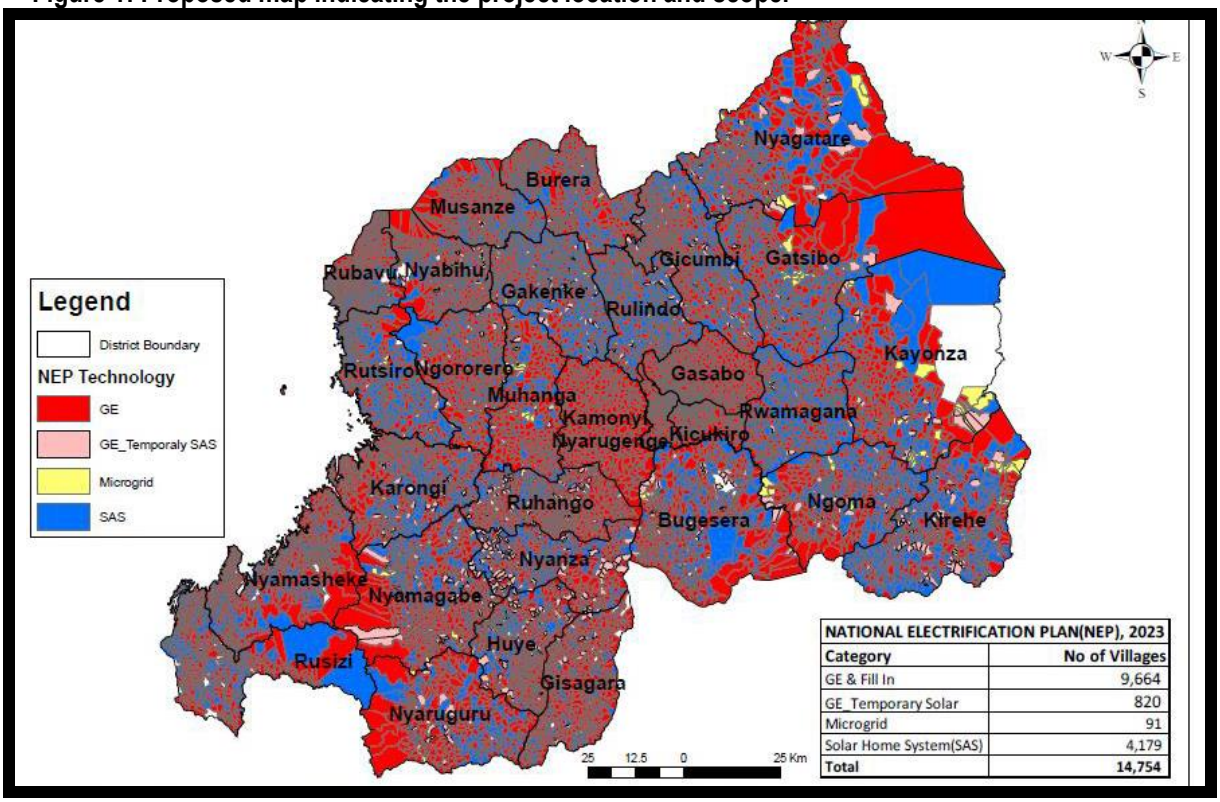
1.1 ASCENT Project description

The ASCENT is a large energy sector investment financing project to support the Government of Rwanda's energy access objectives to achieve energy sector targets. Project would have a total volume of an estimated US$ 400 million. The total IDA investment would be US$300 million and US$ 100 million investment from AIIB, spread across four components of i) increasing access to grid electricity, ii) enhancing the efficiency of electricity service, iii) increasing access to off-grid electricity and clean cooking solutions, and iv) Institutional Capacity Building, Technical Assistance and Implementation Support for energy access acceleration. The grid-related and technical assistance components will be implemented by the ASCENT Project implementation Unit (PIU). It will use Energy Access and Quality Improvement Project (EAQIP) staff, a project in Energy Development Corporation Limited (EDCL), which is the continuity of Energy Access Roll out Program (EARP) that has demonstrated its effectiveness under the Electricity Access Scale-up and Sector Wide Approach (SWAp) Development Project (EASSDP) project (IDA16). The Component 3 "Increasing Access to Off-Grid Electricity, Clean Cooking Solutions, and Productive Uses of Energy (PUE)" - more specifically sub-components 3a, 3b, 3c and 3d - will be implemented by the Development Bank of Rwanda (BRD) which will administer and disburse the funds to the service providers while EDCL will be the technical counterpart focusing on the implementation of sub-component 3e which is about Increasing access to clean cooking for public Institutions.

The World Bank and AIIB funds will be used to connect about 420,000 households (including 79,000 fill-in connections). The districts to be covered under the project are Gisagara, Huye, Muhanga, Nyamagabe, Nyanza, Nyaruguru, Ruhango, Bugesera, Gatsibo, Kayonza, Kirehe, Ngoma, Nyagatare, and Rwamagana. Other districts can be considered during project implementation. The financing will help these districts to reach 75 percent electrification, as well as support fill-in connections in areas with existing grid connectivity. Fill-in connections will be done in the Musanze, Rubavu, Nyagatare, Rwamagana, Gatsibo, Ruhango, Bugesera, Kamonyi, Muhanga, and Nyanza districts, and potentially other districts identified during implementation. Project implementation will commence in areas with no ongoing electrification projects and will be commence in a phase-wise manner in areas with ongoing electrification projects

This ESIA report focuses on the design, supply and installation of new MV and LV lines; design, supply and installation of distribution transformer for distribution network reinforcement; in all district of the Northen Province. The map below indicates the administrative District allocation of each development partner whereby the co-financing has the same colour as shown below:

Figure 1: Proposed map indicating the project location and scope.



Source: REG-EDCL, 2024

1.1. Summary of ASCENT Project Description

Table 1: Summary ASCENT Project components

Project Components		Link to MPA Program Pillars	IDA US$ (m)	AIIB US$(m)	Total US$(m)
1	Increasing Access to Grid Electricity	**Pillar 2:** Expanding Grid Electrification through investments in grid network expansion and reinforcement	207.75	69.25	277
2	Enhancing the Efficiency of Electricity Services		54.75	18.25	73
3	Increasing Access to Off-Grid Electricity and Clean Cooking	**Pillar 3:** Scaling Distributed Renewables and Clean Cooking through financing of off-grid solar and clean cooking solutions, including through private sector mobilization	22.5	7.5	30
4	Institutional Capacity Building, Technical Assistance and Implementation Support for Energy Access Acceleration	**Pillar 1:** Platform to accelerate energy access through development of institutional capacity and mobilization of funding, including scaling up climate funding	15	5	20
Total financing			**300**	**100**	**400**

Source: RUEAP, ESMF-ASCENT, 2024.

1.2 Objectives of the ESIA study

The overall objective of the assignment is to develop an Environmental and Social Impacts Assessment (ESIA) and Environmental and Social Management Plan (ESMP) to ensure that the project is implemented in an environmentally and socially sustainable manner and full compliance with Rwandan and other international environmental and social policies and regulations. These include the World Bank Environmental and Social Standards and the African Development Bank's Operational Safeguards that are applied to the project.

The specific objectives are to:

- Contribute to the environmental and social design of the project;
- Establish a baseline for biophysical, climatic conditions and socio-economic data of the project areas of intervention;
- Identify all potential adverse environmental and social impacts of the project and recommend mitigation measures;
- Develop a comprehensive Environmental and Social Management Plan (ESMP), which will include costs for mitigation; and
- 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;
- prepare an ESIA Report for submission to the Rwanda Development Board (RDB) for project approval and EIA Certificate issuance.

1.3 Scope of the study

Scoping of the study was conducted to collect relevant information to ensure that the ESIA is prepared in compliance with national and international guidelines and procedures. The study covered the impacts of the projects of design, supply and installation of new MV and LV lines; design, supply and installation of distribution transformer for distribution network reinforcement; and upgrading the single lines to three phases lines in the Northen province. Both environmental and social impacts were covered from the planning phase, construction, and operational phases and considered the site selected and its surroundings mainly this ESIA covers component one under ASCENT project. The scope involved to:

- Identify which legislation, and policies (both local and international) are likely to influence this project and how the project will comply with these regulations. Both national and internal were reviewed
- Develop an overview of the baseline environment of the project intervention area. i.e. study area description, physical, biological, and social- economic-environment etc.
- Develop an overview of likely impacts (both positive and negative) that could be caused by the project in its all phases.
- Propose mitigation measures against the predicted adverse impacts.
- Propose an Environmental and Social Management Plan (ESMP) on how these mitigation measures can be implemented.
- Propose an Environmental and Social Monitoring Plan with measurable indicators and parameters for these mitigation measures to ensure the sustainability of the project.

1.4 Approach and methodology

The methodology used to conduct this environmental and social impact assessment was drawn from the general guidelines for conducting ESIA in Rwanda, the terms of references provided by the client and as approved by the Rwanda Development Board, the consultant's technical proposal, and the best practices drawn from international environmental and social policies to conduct such studies. It involves several stages from scoping to understanding and establishing boundaries of the study, the desk review, field visits, review, consultations with stakeholders and local residents existing data analysis (secondary and primary data), prediction of positive and negative impacts, analysis of alternatives, and proposal of mitigation measures leading to the preparation of an Environmental and Social Management Plan and Monitoring Plan. The current environmental and social Impact assessment report is based on electrification funded by ASCENT project based in districts of Northen Province of Rwanda namely Musanze, Gicumbi, Gakenke, Rulindo and Burera. And focuses on the design, supply and installation of new MV and LV lines; design, supply and installation of distribution transformer for distribution network reinforcement; and upgrading the single lines to three phases lines in the above-mentioned districts. The stakeholders were consulted during the preparation of this ESIA report and the annex 3 indicates the contacted stakeholders and their concerns or suggestions have been considered as part of this ESIA Report.

1.4.1 Documents review

A desk work was done concentrating on existing institutional legislation, policies, and laws that are likely to influence the project development. Among the key reviewed documents, they include:

- -Environmental and Social Management Framework (ESMF)for ASCENT
- -Resettlement Policy Framework (RPF)for ASCENT

- -Environmental and Social Commitment Plan (ESCP)
- Fifth Population and Housing Census – 2023
- -World Bank ESF

1.4.2 Socio-Economic baseline data collection

Socio-economic baseline data used were collected in different project areas of intervention through a survey and interviews with local resident. Primary data were collected during the sites visit which were conducted in this region from the 29th January up to 5th February 2024. Data collection used interviews, key informants and focus group discussions. The collected data were completed by data generated from the 5th Population and Housing Census conducted by the National Institution of Statistics (NISR) as published in 2023The presented data covers the Northen province and only indicators related to the project were selected. Used data provided are dependent on the information generated for the thematic report of the census, the details on baseline socio-economic is found in chapter 4 of this ESIA Report.

1.4.3 Environmental and Biological Baseline Survey

The ecological data were collected during the filed surveys and included those reported by residents of the project areas that were collected during interviews. Information collected during the field surveys includes those related to the fauna and flora of the project sites. Data were collected using a check list that was developed prior to site survey. Photo using camera was also used to collect enough data that were analysed in return after the survey. For assessing the conservation status of each species, we used the IUCN Red List of Threatened Species, version 2020-2 (IUCN, 2020). In addition, the ministerial order No 007/2008 of 15/08/2008 establishing the list of protected animal and plant species was consulted to identify plant and animal species protected in Rwanda. It is most important to note that there were no endangered or listed species on the IUCN red list or any species protected in Rwanda that were recorded to be affected by the project activities. This is mostly due the fact that in the project areas as most of the line routes will be passing along the existing buffer zones of the roads of the project areas whereby vegetation is almost cleared and only bushes and shrubs are noted.

1.4.4 Stakeholders' consultation

Information collected from the preliminary desk review was completed by information obtained through interviews with key different stakeholders. The methodology used for stakeholder consultation consisted of interviews and meetings that were organized at different locations of the project sites. At each site, the consultant used a guiding questionnaire with a topic for discussion to provide information about the project. Discussions allowed participants to provide their opinions, and concerns to the project as well as provide some guidance and recommendations. Telephone calls were also used to gather information and data, especially from REG branches operating in the project areas. the attendance list and photolog of the consulted people is available on annex 3 of this Report.

2 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The project's Environmental and Social Impact assessment is conducted to ensure that the proposed project is aligned with and contributes to national and international sustainable development. Thus, the process includes the identification and description of relevant laws, regulations, and standards governing environmental quality, safety and health, protection of sensitive areas, protection of endangered species, etc.

In Rwanda, the national development objectives and environmental management targets are well established in both long-term and short-term strategic plans. This is noted in the Vision 2050 aspirations that provide national targets by 2050 in terms of developments and environmental sustainability as well as the National Transformation Strategy (NST1, 2018-2024) that breaks down the long-term targets into medium-term targets. To this extent, policies, laws, regulations, and institutional framework that will oversee the implementation of the present project and the implementation of proposed mitigation measures are provided in this chapter.

2.1 National Legal and Regulatory Framework

2.4.1 National Policies relevant to this sub-project

✓ **Constitution of the Republic of Rwanda, 2023**

In consideration of the constitution of the Republic of Rwanda of 2023, article 53 on Protection of the environment, states that everyone must protect, safeguard, and promote the environment. The State ensures the protection of the environment. A law determines modalities for protecting, conserving, and promoting the environment.

✓ **Energy Policy (2015)**

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

Specifically, the energy policy takes into consideration the need to:

a) Have affordable and reliable energy supplies countrywide;
b) Reform the market for energy services and establish an adequate institutional framework, that facilitates investment, expansion of services, efficient pricing mechanisms, and other financial incentives;
c) Enhance the development and utilization of indigenous and renewable energy sources and technologies,
d) Adequately consider environmental considerations for all energy activities,
e) Increase energy efficiency and conservation in all sectors; and
f) Increase energy education and build gender-balanced capacity in energy planning, implementation, and monitoring.

✓ **National Land Policy (2019)**

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

✓ **The National Strategy for Transformation (NST1)**

The National Strategy for Transformation (NST1), which is 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 toward 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 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 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 to grow exports by 17% annually. Key strategic interventions include reducing the cost of doing business and facilitating trade by implementing key projects, including scaling up electricity generation and improve quality, affordability, and reliability [Action 23].

✓ **The National Environment and Climate Change Policy (2019)**

The 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 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 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.

It is evident that the energy component, particularly the production and promotion of clean energy and making it accessible to the citizens is central to the policy, especially implicitly implied in strategic objectives (1) Greening economic transformation; and (4) Promoting climate change adaptation, mitigation, and response. The ESIA is a key instrument to ensure environmental sustainability and hence an element toward the realization of the policy's goals and objectives.

✓ **National Strategy for Climate Change and Low Carbon Development (2022)**

Rwanda's Green Growth and Climate Resilience vision and Vision 2050 are for Rwanda to be a developed, climate-resilient, and carbon neutral economy by 2050.

In achieving this vision there are three Strategic Objectives:

- To achieve Energy Security and Low Carbon Energy Supply that supports the development of Green Industry and Services and avoids deforestation.
- To achieve Sustainable Land Use and Water Resource Management that results in Food Security, appropriate Urban Development, and preservation of Biodiversity and Ecosystem Services.
- To ensure Social Protection, Improved Health, and Disaster Risk Reduction that reduces vulnerability to climate change impacts.

Together these refer to the elements upon which Vision 2050 is built, namely the infrastructure and systems that enable low-carbon growth and sustainable resource use, the natural capital and associated spatial development that ensure sustainable development, and the human capital and inclusion that build resilience of the Rwandan people. The purpose of the Strategy is threefold:

- To guide national policy and planning in an integrated way, ensuring alignment with other key documents
- 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

The Strategy calls upon national planners to chart a new development pathway for integrated sector planning that focuses on balancing cross-cutting issues of resource management. The Strategy is the first step in a continuous process, geared to set Rwanda on a course to identify, describe and monitor its current and future vulnerabilities, and take self-determined actions towards building a robust economy. In the next 5 to 10 years the priority is to increase electricity generating capacity and increase connections to the main grid. Small and medium scale hydro-electric plants will be delivered to ensure as electricity generation increases to power households and industries it does so exploiting green technologies as much as possible. The share of households connected to the main grid will progressively increase once the universal access target (of which 52% connected to the grid) is reached in 2024, and a major priority to build on this progress will focus on generating green energy to power productive economic sectors

✓ **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 for achieving the country's national goals. The ESSP will ensure the 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 Strategy takes stock of the previously existing policies, strategies, and laws about Energy sector in Rwanda. The project aims at the realization of this Strategy's objectives.

- ✓ **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 leading 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. The Government developed this strategy to ensure that Rwanda's households have access to electricity through the most cost-effective means by developing programs that will facilitate both the end users to access less costly technologies and increase private sector participation in the provision of these solutions.

- ✓ **The National Biodiversity Policy (2011) and Strategy (2020)**

The National Biodiversity Policy recognizes 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 latter 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.

Therefore, this policy provides for the establishment of a System of Protected Areas whose protection and management are 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 endeavours to identify which elements of the biodiversity could be affected by the project and establish the relevant mitigation measures.

- ✓ **The National Forest Policy (2018)**

The National Forest Policy is concerned with issues related to forests, but also to the 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 ESIA will endeavour 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. Restauration of affected trees will be done through repletion of the same affected tree species.

- ✓ **Revised National Gender Policy (2021)**

The 2021 gender policy emphasizes on effective engagement of men and boys and accelerating gender mainstreaming in the private sector – the engine of Rwanda's economy. The vision of this National Gender Policy is for Rwanda to become a nation that enjoys gender equality and equity toward national and sustainable transformation. The policy requires that institutions devise mechanisms and programs to ensure shared responsibility between men and women over domestic work/unpaid work as well as the use of time and energy saving investments by securing alternative energy sources for cooking.

Furthermore, the policy strengthens existing community structures such as Umugoroba w'Imiryango, Inshuti z'Umuryango to prevent and eradicate Gender Violence (GBV) and child abuse. These will include capacity enhancement of these structures, provision of incentives to care for workers, and provision of clear guidelines for the operationalization of these. It also enhances accountability and access to justice for victims of GBV both men and women, boys and girls. 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 considers gender differences and inequalities.

2.4.2 National Regulations

✓ **Law n°48/2018 of 13/08/2018 on environment**

The law on environment regulates the protection of the environment in Rwanda and sets out the general legal framework for environmental protection. The law requires to preparation and implementation of environmental management instruments and get required permits before any construction.

Article 30 stipulates that the list of projects that must undergo an environmental impact assessment before they obtain authorization for their implementation is established by an Order of the Minister. An Order of the Minister also issues instructions and procedures for conducting environmental impact assessment.

Article 33 of this law stipulates that the environmental impact assessment, environmental audit, and strategic environmental assessment must be approved by the Authority, or another State organ authorized in writing to do so by the Authority. If the approval is made by an authorized organ, such an organ does so on behalf of the Authority which is also responsible for its audit.

Article 46 stipulates that any person who does not carry out environmental impact assessment before launching any project that may have harmful effects on the environment while it is required, is punished by suspension of his/her activities or closure of his/her association and ordered to rehabilitate the damage to environment, persons, and property. He/she also pays an administrative fine of two percent (2%) of the total cost of the project.

The project will comply with the requirements of the law to get the environmental instruments and get required permits before the project starts. 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.

✓ **Law n° 32/2015 of 11/06/2015 relating to expropriation in the public interest.**

The Law determines the procedures relating to expropriation in the public interest.

Article 3 of this law notes that 'No person shall hinder the implementation of the program of expropriation in the public interest on the pretext of self-centred ed interests. **Article 17** states that after the publication of a decision on expropriation in the public interest, complete with a list of holders of rights registered on land titles and property incorporated on land, landowners shall not develop any long-term activities on the land, otherwise such activities shall not be compensable during expropriation. In terms of valuation, **Article 22** states that land values and prices for property consistent with the prevailing market rates shall be established by the Institute of Real Property Valuers in Rwanda.

According to **Article 26** land titles must be produced as evidence of ownership and evidence of marital status as applicable. Any persons dispossessed of land, unlawfully occupying land, or having developed activities prohibited after the enactment of relevant laws shall receive no compensation. **Article 27** reaffirms that compensation for land must include any improvements on the land and compensation for disruption associated with expropriation. The compensation for disruption caused by expropriation to be paid to the expropriated person shall be equivalent to five percent (5%) of the total value of his/her property expropriated.

Article 32 refers to a sign-off by the owner once he/she is satisfied with the valuation. Article 33 allows for any person not satisfied with the valuation to contest in writing within seven days. Any person contesting the assessed value must engage the services of a valuer or a valuation firm recognized by the Institute of Real Property Valuer in Rwanda, at their own expense, to carry out a counter-assessment of the value. Under **Article 34** if unsatisfied the matter may be referred to the courts. However, the compensation will be paid pending the court's decision so as not to delay expropriation. In terms of payment of compensation, **Article 35** notes that, 'fair compensation can be paid in monetary form in the Rwandan currency, or any other form mutually agreed upon by the expropriator and the person to be expropriated'. **Article 36** notes that compensation must be paid within 120 days of approval by the Ministry, or otherwise becomes null and void, unless mutually agreed otherwise.

✓ **Law governing land in Rwanda (2021)**

Article 34 stipulates that the landowner shall enjoy full rights to exploit his/her land by 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 project implementation will consider the ownership and use of land, specifically taking note of land tenure and related compensation matters. The ESIA will provide an avenue for compliance with this law, while its provisions are to be addressed through the Compensation schemes.

✓ **Law No 52/2018 of 13/08/2018 governing electricity in Rwanda**

This Law governs activities of electric power production, transmission, distribution, and trading within or outside the national territory of the Republic of Rwanda. Under this law, there is an establishment of a 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 authorization to operate in a public or a private domain to be granted for electricity transmission or distribution license holder. However, Art 48 provides for an Expropriation of the right of way for the public interest. The right of way is necessary for the operators in the production, transmission, distribution, and supply of electricity. It shall be exercised by the standards set by the regulatory agency. Expropriation shall be conducted by the Law governing expropriation for public interest.

Law N° 70/2013 of 02/09/2013 Governing Biodiversity in Rwanda

The purpose of this Law is to determine modalities for the management and conservation of biological diversity within Rwanda. 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.

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.

✓ **Law regulating labor in Rwanda N° 66/2018 of 30/08/2018**

Labor 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 with international best practices. The new labour law distinguishes between collective and individual labour disputes. By this law, an employer is responsible for maintaining the health and safety of the workers at the workplace. The 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.

✓ **Ministerial order No 001/2019 of 15/04/2019**

This order determines the list of projects that must undergo environmental impact assessment, instructions, requirements, and procedures to conduct environmental impact assessment. Its article 3, Annex 1 gives the list of works, activities, and projects that have to be subject to a full environmental impact assessment before being granted authorization to commence. Number 12 of this annex puts this project on the list of projects that must undergo the full EIA. It stipulates those projects of construction of hydro-dams, hydropower plants, and electrical lines of high and medium voltage must undergo the full EIA before the commencement of the Works.

✓ **Ministerial Order 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

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.

✓ **Environmental Impact Assessment Guidelines 2006**

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

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

2.2 National Institutional Framework

2.2.1. Ministry of Environment (MoE)

The Ministry of Environment (MOE) has the vision of protecting the environment for the safeguarding of green and climate-resilient Rwanda for the 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.
The Ministry of Environment has the following main responsibilities:

- to develop and disseminate the environment and climate change policies, strategies, and programs through:
- to monitor and evaluate the implementation and mainstreaming of environment and climate change policies, strategies, and programs across all sectors, especially the productive sector;
- to oversee and evaluate institutions under its supervision by guiding the implementation of specific programs to be realized by the institutions under its supervision and local government;
- to mobilize the necessary resources for the development, protection, and conservation of the environment for climate change adaptation and mitigation.

2.2.2. 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 oversees 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.

2.2.3. Rwanda Environmental Management Authority (REMA)

Under the supervision of the Ministry of Environment, and as per 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 a national position to emerging global issues to enhance the well-being of the Rwandan people. The vision of REMA is to ensure that all sectors of the Rwandan Society value and undertake sound environmental management and rational use of natural resources to contribute to the national aspirations for sustainable development.

2.2.4. Rwanda Development Board (RDB)

RDB was established in 2009 to coordinate, spur, and promote national economic development. RDB is evidence that Rwanda is open for business. It is truly a one-stop center 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 that support the priority sectors of ICT and tourism as well as SMEs and human capacity development in the private sector. RDB deals also with issuing EIA Certificates for investment projects in a bid to ease business in Rwanda.

2.2.5. Rwanda Energy Group Ltd (REG)

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-centred 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."

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).

2.2.6. 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. 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.

2.2.7. Energy Development Company Limited (EDCL)

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 neighbouring countries and power pools. EDCL works closely with MININFRA.

2.2.8. Rwanda Utilities Regulatory Agency (RURA)

RURA has 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.

To fulfil 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.

2.2.9. Institutional framework related to social protection

LODA's primary responsibility is the coordination and the implementation of the Graduation Strategy among key stakeholders (development partners, districts and NGOs/CSOs) to ensure that vulnerable households are supported to graduate from poverty. Under this sub-project, the EDCL shall work with the district to support vulnerable households within the intervening area, the special attention shall be made to the identified vulnerable people during all project activity. LODA focus on the implementation of social safety nets and livelihoods, as well as the funding of community and household projects.

LODA has the following key responsibilities under Social Protection:

1. Alignment of policies and institutional arrangements (governance framework, multi-sectoral approach, guidelines and training of staff);
2. Understanding clients and effectively support them (Sector & Cell staff, Para-social workers, Graduation contract);
3. Implementation of the Vision Umurenge Program (VUP), including Safety nets, Livelihoods and the various social protection programs;
4. Implementation of the UBUDEHE Program, including the community self-help projects and individual household projects;
5. Ensure vulnerable households have access to complementary services (para-social workers; NGOs, local service providers)
6. Provision of a wider enabling environment (Infrastructure – markets, transport, land, electricity, …) for graduation from poverty;

2.3. International Conventions

Rwanda has signed and ratified different environmental international conventions which are to some extent in line with this project. The following are conventions connected to the project implementation:

- The International Convention on Biological Diversity and its Habitat was signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 017/01 of 18 March 1995;
- The CARTAGENA protocol on biodiversity to the Convention on Biological Biodiversity signed in NAIROBI from May 15, to 26, 2000, and in NEW YORK from June 5, 2000, to June 4, 2001, as authorized to be ratified by Law No 38/2003 of 29 December 2003;
- The United Nations Framework Convention on Climate Change, signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 021/01 of 30 May 1995;
- The Kyoto Protocol to the framework on climate change adopted at Kyoto on March 6, 1998, as authorized to be ratified by Law No 36/2003 of December 2003;
- The RAMSAR International Convention of February 2, 1971, on Wetlands of International importance, especially as water flows habitats as authorized to be ratified by Law No 37/2003 of 29 December 2003;
- The STOCKHOLM Convention on Persistent Organic Pollutants, signed in STOCKHOLM on 22 May 2001, as approved by Presidential Order No 78/01 of 8 July 2002;
- The ROTTERDAM International Convention on the establishment of the international procedures agreed by states on commercial transactions of agricultural pesticides and other poisonous products, signed in ROTTERDAM on 11 September 1998 and in New York from 12 November 1998 to 10 September 1999 as approved by Presidential Order No 28/01 of August 2003 approving the membership of Rwanda;
- The Basel Convention on the Control of Tran boundary Movements of Hazardous wastes and their disposal as adopted at Basel on 22 March 1989, and approved by Presidential Order No 29/01 of 24 August 2003 approving the membership of Rwanda;
- The Montreal International Conventional on Substances that Deplete the Ozone Layer, signed in London (1990), Copenhagen (1992), Montreal (1997), and BEIJING (1999), especially in its article 2 of London amendments and Article 3 of Copenhagen, Montreal, and Beijing amendments as approved by Presidential Order no 30/01 of 24 August 2003 related to the membership of Rwanda;
- The Bonn Convention opened for signature on June 23, 1979, on conservation of migratory species of wild animals as authorized to be ratified by Law No 35/2003 of 29 December 2003;
- The Washington agreement of March 3, 1973, on international trade in endangered species of Wild Flora and Fauna as authorized to be ratified by presidential Order No 211 of 25 June 1980.

2.4. International agreements

The following table indicates different agreements connected to environmental protection which Rwanda is a signatory:

Table 2: Environmental assessment-related agreements

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

These treaties and international agreements are relevant for the protection and conservation of the environment and biodiversity in Rwanda and shall guide the implementation of the present project.

2.5. World Bank's Environmental and Social requirements applicable to the project

The present project implementation is funded by the World Bank and therefore needs to comply with the WB's Environmental and Social Standards. The next table summarizes standards relevant to the project and borrows requirement:

Table 3: World Bank's Environmental and Social Standards applicable to the project

SN	World Bank ESS	Objectives	Borrower Requirements
1	**ESS1: Assessment and Management of Environmental and Social Risks and Impacts**	Identify, evaluate, and manage the environmental and social risks and impacts of the project in a manner consistent with the ESS1; Adopt a mitigation hierarchy approach to avoid, minimize (reduce), mitigate, and compensate(offset) Utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate.	Use and strengthening of the Borrower's environmental and social framework for the assessment, development, and implementation of World Bank-financed projects as appropriate.
2	**ESS2: Labor and Working Conditions**	Promote safety and health at work; Promote the fair treatment, non-discrimination, and equal opportunity of project workers; Protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, by this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate; Prevent the use of all forms of forced labor and child labor; Support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law; Provide project workers with accessible means to raise workplace concerns.	Prepare and adopt labor management procedures with provisions on the treatment of direct, contracted, community, and primary supply workers, and government civil servants; Terms and conditions of work, non-discrimination and equal opportunity and workers organizations: Child labor and forced lab our; Requirements on Occupational Health and Safety, in keeping with the World Bank Group's Environmental, Health, and Safety Guidelines (EHSG).
3	**ESS3: Resource Efficiency and Pollution Prevention and Management**	Promoting sustainable use of resources, including energy, water, and raw materials; Avoiding or minimizing adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; Avoiding or minimizing project-related emissions of short and long-lived climate pollutants; Avoiding or minimizing generation of hazardous and non-hazardous waste	Prepare and adopt labor management procedures with provisions on the treatment of direct, contracted, community, and primary supply workers, and government civil servants; Terms and conditions of work, non-discrimination and equal opportunity and workers organizations: prevention of Child labor and forced labour, ensuring Occupational Health and Safety, in keeping with the World Bank Group's Environmental, Health, and Safety Guidelines (EHSG).
4	**ESS4: Community Health and Safety**	Anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances; Avoid or minimize community exposure to project-related traffic and road safety risks, and hazardous materials; Have in place effective measures to address emergency events;	Implement requirements for community health and safety regarding infrastructure, and climate change, and apply the concept of universal access, where technically and financially feasible. Prepare and implement disease prevention and risk management plan, implement requirements for traffic and road safety, including road safety

SN	World Bank ESS	Objectives	Borrower Requirements
		Ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	assessments and monitoring. Address risks arising from impacts on provisioning and regulating ecosystem services. Measures to avoid or minimize, water-related, communicable, and no communicable diseases identify and manage risks related to labour influx on communities (SEA/SH, noise and air pollution …)
5	**ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**	Avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives.; Avoid forced eviction; Mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use; Improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure; Conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant; Ensure that resettlement activities are planned and implemented with appropriate disclosure.	Ensure that the acquisitionon land and assets happens only after payment of compensation and resettlement has occurred and implement livelihood restoration plans for PAPs. Implement community engagement and consultation, disclosure of information, and put in place a grievance mechanism.
6	**ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**	Protect and conserve biodiversity and habitats; Apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity; Promote the sustainable management of living natural resources; Support livelihoods of local communities, through the adoption of practices that integrate conservation needs and development priorities.	Implement requirements for projects affecting areas that are legally protected designated for protection or regionally/ internationally recognized to be of high biodiversity value. Implement requirements relating to primary suppliers, where a project is purchasing natural resource commodities, including food, timber, and stones, water etc..
7	**ESS8: Cultural Heritage**	Protect cultural heritage from the adverse impacts of project activities and support its preservation; Address cultural heritage as an integral aspect of sustainable development; Promote meaningful consultation with stakeholders regarding cultural heritage; Promote the equitable sharing of benefits from the use of cultural heritage.	Put in place a chance-finds procedure. Ensure people's continued access to culturally important sites, as well as the need for confidentiality when revealing information about cultural heritage assets that would compromise or jeopardize their safety or integrity. Putin places a mechanism for fair and equitable sharing of benefits from commercial use of cultural resources. Establish provisions for archaeological sites and materials, built heritage, natural features with cultural significance, and moveable cultural heritage.
8	**ESS10: Stakeholder Engagement and**	Establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build	Preparation and implementation of a Stakeholder Engagement Plan (SEP). The SEP involves early identification of

SN	World Bank ESS	Objectives	Borrower Requirements
	Information Disclosure	and maintain a constructive relationship with them, particular project-affected parties; Assess the level of stakeholder interest and support for the project and enable stakeholders' views to be taken into account in project design and environmental and social performance; Ensure that appropriate project information on environmental and ocial risks and impacts is disclosed to stakeholders in timely, understandable, accessible and appropriate manner and format; Provide project-affected parties with accessible and inclusive means to raise issues and grievances and allow Borrowers to respond to and manage such grievances.	stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. Stakeholder engagement is to be conducted in a manner proportionate to the nature, scale, risks, and impacts of the project, and appropriate to stakeholders' interests. Specifies what is required for information disclosure and to achieve meaningful consultation and GRM establishment and operationalization as well

3. PROJECT JUSTIFICATION AND DESCRIPTION

Energy is increasingly proving to be a basic essential without which true development is not possible. Access to energy is an essential driver for development due to its effect on poverty and hunger, health, education, improving living conditions, and reducing the exodus from the countryside and on the environment. Making electricity available in homes reduces the use of batteries and 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 CO_2 caused by the burning of wood cooking and lighting.

3.1 Project location

The present project of design, supply and installation of new MV and LV lines; design, supply and installation of distribution transformer for distribution network reinforcement; and upgrading the single lines to three phases lines will be implemented in different sectors making the district of the Northen Province of Rwanda. The districts of intervention are respectively Rulindo, Gakenke, Musanze, Burera and Gicumbi. Maps showing the sectors of the project area of intervention are provided in annexure 2 of this report and the sectors of the project intervention are detailed in the chapter of the baseline data. The electrical lines will mostly be passing along the existing earth roads connecting different centres of the sectors of areas of intervention. The buffer zones of the existing roads connecting different area will be used as line routes and to facilitate easy transportation of project materials, allow easy connection of houses, reduce vegetation clearance in the RoW, facilitate easy maintenance, and reduce maintenance costs related to vegetation control in the ROW. However, where not possible to follow the existing roads, in some areas the lines will pass in agricultural land to reduce the length of the lines. The land acquisition will be limited to poles and transformer locations. (Maps of the project location are provided in annex 2 of the report).

3.2 Project justification

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 why the government has set the target of Universal Electrification (100% access) for the year 2024. The installed energy capacity is envisaged to grow at a 15% rate per annum to reach an installed energy capacity of 554MW by 2024. In the end of 2023, 51% of Rwandan households had 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, to bridge the demand-supply imbalance, while making economic sense of future energy investments. The construction of the transmission lines in the Northen province of Rwanda will therefore be a driving force for the economic and social development of the country, by improving and increasing electric energy availability. The planned project will help to improve the quality of electricity supply 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.

3.3 Benefits of access to electric power

Power being today a major drive of development, the increase in the rate of access to electric power will certainly contribute to the achievement of the NST1 and other Development Plans of Rwanda 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. Among key benefits that the project will provide in project areas include only to mention some:

a. Reduced poverty and hunger

Access to electric power allows for a longer working day, access to light, and time and money saved (easier access to energy and water). Moreover, the use of electric equipment makes 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 the automation of processing activities for agricultural products and their conservation (refrigeration).

b. Health benefits

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

c. Benefits to education

Energy and access to electric lighting make easier for pupils to study at night in good conditions. Availability of electricity allows for access to the Internet and tele-education, which thus increases 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.

d. On the improvement of living conditions, particularly for women

Within the household, women often perform most of the domestic tasks. Access to electricity and the elongation of the duration of a working day 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 ensure 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 traditional societies.

e. Decrease of rural exodus

The improvement of living conditions of rural households and local job creation increases economic development and helps reduce the need for rural exodus.

f. Benefits of the environment

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

3.4 Project Components

The main component of the present project is the construction of electrical distribution networks in different sectors of the districts of the Northen province. The focus is to connect households and public institutions (schools, administration offices, health centers, etc) and productive users (small industries where applicable). Key main activities to be completed by the project are detailed in the next sections.

3.5 Project activities

During the implementation of the present project, different activities will be done, and these are divided into 4 phases: (i) Design and Planning phase, (ii) Construction Phase, (iii) Commissioning Phase, and (iv) Operation Phase. The main project activities will include but not limited to

- pegging out works and bush clearing and line surveying, excavation, rock-filled backfilling and concrete foundations;
- supply and installation of LV poles both wooden and cencter poles of different length and dimensions;
- LV structure assemblies (excluding poles only) including all bolts, nuts, washers, crimp joints, etc;
- MV structure assemblies (excluding poles only) for 30kv including all brackets, bolts, nuts, washers, crimp joints, etc;
- overhead conductor installation
- Transformers installation
- service connections

3.5.1 Activities during the design and planning phase

During the design and planning phase, it will be a process of survey and mapping for new transmission and

distribution line routes, and site selection of transformers locations to avoid harming sensitive ecosystems. There is no land acquisition for MV and LV lines as these will be passing in land for agriculture forest, pasture and/ or in the buffer zones of the existing roads of the project area. Maximum effort will eb made to avoid passing over the residential plots and other sensitive areas.

3.5.2 Construction phase

a. Clearance of the ROW

During the construction phase, it will be the process of clearing the Right of Way (ROW) as the initial activity that will occur during the construction phase. This is done to create the vertical and horizontal clearance required when constructing power lines. The clearance will be done on 12 meters large (6 m each side from the center line). Only trees and crops that can grow to more than 3 meters in height will be cleared on 12 meters. The valuation of affected trees and assets will be done to 12 meters and will cover all trees and crops on that surface. In any case, a residential house found within the 6 m will be relocated and fair compensation will be done. However, maximum efforts will be made during the line re-route design and construction to avoid houses under the RoW.

b. Foundation excavation and poles erection

Foundation excavations and erection of poles will consist of creating the foundations for poles. Concrete and wooden poles are planned to be used by the project. The general outlines of the poles may be varied but the general dimensions, phase spacing, clearances, and the configuration of the conductors and earth wire are those applied to similar projects being implemented countrywide for similar electrical distribution project.

Figure 2: Typical wooden poles to be used by the project

Source: On field survey, April 2024

c. Installation of transformers.

MV/LV transformers will be installed at different sites along the transmission lines to supply electricity to neighbouring houses and public facilities. These transformers will play the role of stepping down the electricity from MV to LV before distribution to consumers.

3.5.3 Activities of the project during the operation phase

During the operation phase, project activities will be mainly the operation and maintenance of the transformers and the electrical lines that will have been installed during the construction phase. It is important to note that both EDCL EUCL are no longer use transformers containing PCBs (as commonly used in old equipment) which are harmful to the environment and humans.

a. Maintenance of the RoW

The transmission line requires clearing a permanent ROW. Its width generally is 12 m wide. Trees along the ROW must also be cleared for the safety of the lines. The regular maintenance of the ROW will be done to maintain clearance, among poles, conductors, and all the vegetation or structures. Those maintenance operations will normally take place twice a year but may vary according to the local conditions of the project areas.

b. Maintenance of the transformers

As for the line, maintenance for the transformers is required. It must provide for the regular replacement of coolants and lubricants for transformers. However, this is not frequently done unless where it is required to be.

3.5.4 Decommissioning phase

During the decommissioning phase, project activities will be dismantling and removing all the structures from project construction sites, dismantling the supporting infrastructures and all those structures that were associated with the project implementation. The project also will rehabilitate the damaged sites to their former status or near what they were before the project was commissioned. This will include but not limited to the stores demolition, returning the remainder materials to EDCL Stores, revegetation of the soil where the poles and other materials were stored etc

4. PROJECT ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

The description of the current baseline state provides the context from which to consider the environmental and social impacts of the proposed project. The detailed baseline characteristics described under this section include both physical, biological, and socio-economic indicators ..

4.1 Physical and Biological Environment

4.1.1 Rulindo district

a) Location

Rulindo is an administrative entity that make up the Northern Province, others being; Gakenke, Burera, Gicumbi and Musanze. The district has 17 administrative Sectors: Base, Burega, Bushoki, Buyoga, Cyinzuzi, Cyungo, Kinihira, Kisaro, Masoro, Mbogo, Murambi, Ngoma, Ntarabana Rukozo, Rusiga, Shyorongi, Tumba. These sectors are subdivided into 71 Cells and 494 Villages (Imidugudu). The surface area of Rulindo District is 567 km2

b) Topography

Rulindo District is mostly characterized by hills among which include; Tare, Tumba and the Cyungo hills with their altitude rising to 2,438 m. These hills are interspersed by valleys and swamps that also border rivers such as Nyabarongo, Muyanza and Nyabugogo. The valleys and swamps such as Rugezi feeds lake Burera and in turn supplies the fall of Ntaruka in Burera district which is a source of hydro energy to the country. This interweaving of hills and valleys with rivers provides a beautiful and eye-catching scenery to both citizens and visitors.

c) Climate and Rainfall

Rulindo District has a tropical climate, characterized by a succession of rainy seasons and droughts. The dry season usually extends from June to August and January to February while the rainy season normally stretches from September to December and March to May. The average annual temperature is 19ºC. High temperatures are observed in August where they reach 28 ºC in the middle of the day. During the rainy seasons, the district encounters concentrations of mists in the valleys in the morning and on the hilltops in the late morning. Rainfall normally reaches 1,243.3 mm per year on average.

d) Hydrography

Rulindo District has significant water reservoirs from local sources including rivers that have a steady flow into valleys that enables the district to have water even during the dry seasons. The main rivers that flow into the district are Base, Bahimba, Mulindi, Cyonyonyo, Cyohoha, and Rukeri, Muyanza. None of the schools of intervention has been found to be located in any near water body however, during surveys it was noted that some of the schools may face the challenges associated to soil erosion due to heavy rains on some extent. To this it was recommended that the designs take into consideration the recorded information and be adopted accordingly.

4.1.2 Gakenke district

a. Location

The District of Gakenke is one of the five districts of the Northern Province with 704,06 km2. It is subdivided into 19 administrative sectors, 97 cells, 617villages (Imidugudu) and 84,4562 Households. The district shares borders with Rulindo District to the East, Burera and Musanze Districts to the North, Nyabihu District to the West, Kamonyi and Muhanga Districts to the south. he location of the district on the road Kigali-Musanze provides some opportunities related to some activities that may be attractive to passengers like that of Nyirangarama Enterprise.

b. Topography

Gakenke district is characterized in general by high inclined hills separated by rivers and marshlands. The relief seems to comprise two distinctive regions with the high altitude egion with mountains attaining at least 2648m (Mont Kabuye) and another region characterized by low inclined hills of about 1700m of altitude. Marshlands occupy an area representing 361 Hectares. These marshlands are generally exploited during the dry season (May-September).

c. Climate and Rainfall

The District of Gakenke is endowed with reserves that could provide enough water for both consumption and agricultural purposes. These include substantial rainfall (between 1100 and 1 500 mm per year) and the abundance

of streams and watercourses. The main rivers flowing in Gakenke district are Cyacika, Bahimba, Isumo, Busanane, Kiyebe, Sanzare, Gaseke, Kinoni, Nyamuhanga, Base and Mugobore. The District of Gakenke enjoys parts of Ruhondo Lac on the side of Kamubuga and Kivuruga Sectors. Alongside Gakenke district, two main rivers go along which are Mukungwa River at the western side of the district, and Nyabarongo River at its South. The last two rivers pour their water in Akagera River, tributary of Nile River. Since most houses are situated on the summit and on the slopes of hills and due to the accidental relief in Gakenke district, the erosion takes what would be the fertile soil to Mukungwa and Nyabarongo Rivers then to be taken to Nile River. The district has to take precautions to contain its soil and to protect it against erosion.

d. Hydrography

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4.1.3 Musanze district

a. **Location**

Musanze District is one of the six secondary cities and one of the 5 districts comprising in the Northern Province of Rwanda. The total area of the district is 530,4 km², 60 km2 of the Volcanoes National Park and 28 km2 by Lake Ruhondo. Musanze City is about 110 km from Kigali on the major Kigali-Musanze-Rubavu-Goma Road and it borders with Uganda and DR Congo in the North, Gakenke District in the South, Burera District in the East and Nyabihu District in the West. The district has 15 administrative sectors, 68 cells and 432 villages**.**

b. Topography

Musanze District is the most mountainous part of Rwanda and contains the largest part of the Volcanoes National Park. Five of the eight volcanoes of the Virunga chain are Karisimbi, Bisoke, Sabyinyo, Gahinga and Muhabura. They are within the district boundaries. Karisimbi is the tallest point in Rwanda at 4,507m and is the sixth tallest peak in Africa. The Rwanda and Democratic Republic of Congo border crosses over the peak of Karisimbi.

c. Climate and Rainfall

Musanze receives high rainfall almost all year round. The region is characterized by four distinct seasons: a first rainy season from September to December, a short dry season in January followed by a long rainy season from February to May and a long dry season from June to August. The district is located at an altitude of 1,850m and has one of the most agreeable climate in Rwanda. Warm and breezy days are followed by cooler nights. April and May bring about the heaviest rains, whereas October and November have a much more moderate rainy period. The Average amount of rainfall during the rainy seasons is 1 000-1 200mm per month

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d. Geology and Soils

The district has 2 distinct zones and consequently related types of soils, one being volcanic area with moderate slopes and volcanic ash soils with lava predominant stones. The other part comprises steeply hills where erosion is active. The soils of the City of Musanze can be categorized as volcanic on moderate to steep slopes, with volcanic ash soils and volcanic lava predominating with stones and shallow rocks. Soil erosion and soil nutrient loss are major problems, with only about half the land protected against soil erosion The rich volcanic soils are ideal for agriculture, especially crops such as the Irish potato, which is commonly grown in Cyuve, Busogo, Gataraga, Kinigi, Muhoza, Muko, Musanze, Nyange and Shingiro. The Irish potato has been proposed for processing into potato crisps.

e. Hydrography

Musanze District is made of different water sources including lakes, rivers and swamps. Among them include Susa, Muhe, Rwebeya, Rungu, Cyuve, Kansoro and Mudakama which have their origin in Volcanoes National park and

mainly during rainy season.
There are also main rivers such as Mpenge, Kigombe and Mutobo which flows into Mukungwa River which in return flows into Nyabarongo River. Musanze also touches on Lake Ruhondo with an area estimated at 28 km^2.

4.1.4 Burera district

a. Location

Burera District lies in the Northern Province of Rwanda, adjacent to the Ugandan border to the North and East, and between the cities of Musanze and Gicumbi. Within it is boarded by Gakenke and Rulindo Districts in the East and in the South by Musanze District in the West. It is home to Lakes Burera and Ruhondo. The district also contains the Cyanika border post, gateway to Kisoro and southwestern Uganda. The total surface area of the district is 645 km^2. Burera district is divided into 17 Sectors 69 cells and 571 villages distributed in all sectors.

b. Topography

The topography of Burera District is characterized by a mix of hilly and mountainous terrain.The district's elevation ranges from about 1,800 meters to over 2,600 meters above sea level. The higher elevations are typically found in the northern and western parts of the district, contributing to its diverse topography. The district is part of the Virunga massif, which includes prominent volcanic mountains such as Mount Muhabura, Mount Gahinga, and Mount Sabyinyo. These mountains form part of the border with Uganda and the Democratic Republic of Congo.

c. Climate and Rainfall

Burera District experiences a moderate climate and generally the district enjoys mild temperatures due to its elevation. Average temperatures range between 14°C and 25°C throughout the year, with cooler temperatures typically experienced during the night and early morning.

District has a bimodal rainfall pattern, meaning it experiences two main rainy seasons: (i) the long rainy season occurs from March to May and (ii) the short rainy season that occurs from September to November.
The annual average rainfall ranges from 1200mm to 1600mm, with the heaviest rains usually falling in April and May.
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d. Geology and Soils

The district is part of the volcanic region of the Virunga Massif, which includes a range of mountains and extinct volcanoes. The geology is dominated by volcanic rocks, such as basalts and andesites, as well as pyroclastic deposits. These volcanic formations contribute to the region's fertile soils, which are conducive to agriculture. Additionally, the district contains sedimentary rocks that are primarily composed of limestone, sandstone, and shales, which are indicative of the area's geological history and the processes that have shaped its landscape over time.

e. Hydrography

The district is home to Lake Burera, one of the twin lakes (along with Lake Ruhondo) that lie at the base of the Virunga Mountains. These lakes are a significant feature of the district's landscape and are important for local agriculture and tourism. Numerous rivers and streams flow through the district, often creating deep valleys and gorges. These water bodies contribute to the fertile soils and lush vegetation found in the region.

4.1.5 Gicumbi district

a. Location

Gicumbi District is one of the five districts that make up the Northern Province. It is made up of twenty-one (21) administrative sectors a hundred and nine cells (109) and six hundred and thirty (630) villages (Imidugudu). It is bordered by Burera district in the North, Nyagatare, Rwamagana and Gatsibo in the East, Gasabo and Rwamagana in the South and in the West, it borders Gasabo, Burera and Rulindo. The district extends over a total surface area of 829 km2.

b. Topography

The relief of the district is characterized with steep slopes and a mountainous topography. The plateau is surrounded by steep ravines with small valleys segmented by multiple swamps. It is a succession of steep hills giving rise to multitude of watersheds all converging towards the Great Basin of the Nile. Gicumbi district area is hilly characterized with lateritic soils and granites which leads to high rates of soil erosion during the long and heavy rain. The Eastern part of Gicumbi is not hilly and it is composed of valleys with altitudes ranging from 1,500 and 1,800m. In the Southern part of the district, there is lake Muhazi located at an altitude of 1,500m.

c. Climate and Rainfall

Gicumbi district has four seasonal climates: 2 rainy seasons and 2 dry seasons. Ordinary the minor rainy season begins in September to December and the short dry season extends from January to February while the long rainy season extends from March to May when the long dry seasons begins June to August. The district has a tropical climate with a rainfall ranging between 1200mm and 1500mm; therefore, agriculture is favored by the presence of humid soils

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d. Geology and Soils

Gicumbi district exhibits a complex geological composition. The district's geology is characterized by Precambrian rocks, which are among the oldest rock formations. These rocks primarily consist of granites, gneisses, and schists. The area also features volcanic rocks due to historical volcanic activity in the region, contributing to its diverse geological structure. The presence of these rock types indicates significant tectonic activity and metamorphic processes that have shaped the landscape over millions of years.

Soils are predominantly derived from the weathering of the underlying geological formations. These soils are generally fertile and suitable for agriculture, which is a key activity in the region. The main soil types include:

- Ferralsols: These are deeply weathered soils rich in iron and aluminum oxides, giving them a reddish color. They are typically found on hills and highland areas and are good for growing crops like tea and coffee.
- Andosols: Found in areas influenced by volcanic activity, these soils are rich in organic matter and nutrients, making them highly fertile and ideal for various crops.
- Nitisols: Known for their high clay content and good structure, these soils are also fertile and support intensive agricultural practices, including the cultivation of crops such as maize, beans, and potatoes.

e. Hydrography

The hydrographic network of the district consists of many rivers and streams. These rivers and streams lie in the plains forming swamp. Such rivers include Mwange, Mulindi, Mutulirwa, Walufu, Muyanza and Gaseke among others. Hydrography of the district is also characterized by the wetlands of Rugezi and Lake Muhazi whose waters are shared with Burera district in the North and Rwamagana in the eastern region and Gasabo. Gicumbi falls in the catchments of Muvumba and Nyabarongo and 60% of its land area is situated in the degraded Muvumba watershed located in the Kagera sub-basin part, the upstream section of the Nile Basin, with its ultimate outflow into the Mediterranean Sea.

Figure 3: Topographical and typical vegetation characteristics of the project areas inn northern province

Source: Field survey, April 2024

4.2 Socio-economic characteristics

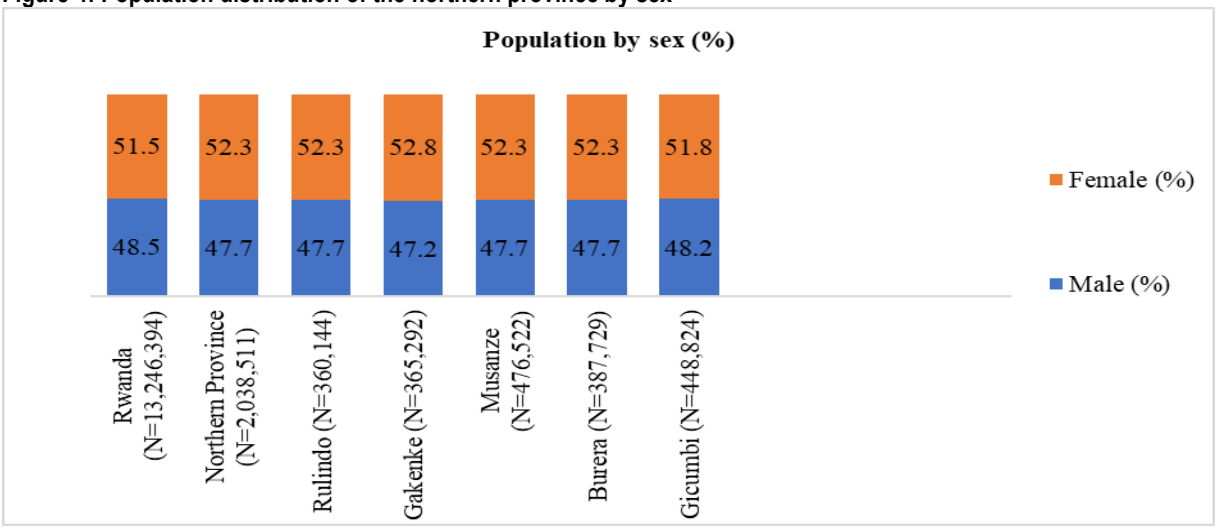
The 5th Population and Housing Census (5th PHC, by NISR 2022), noted that the Northern province has a total population of 2,038,511 populations, where 47.7% are males and 52.3% females. The spatial distribution of the population of the Northen province by district and by area of living is provided in the table below:

Table 4: Distribution of the population of northern province by area of living and by district

Province and District	Total			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Northern province	**2,038,511**	**972,960**	**1,065,551**	**353,729**	**170,807**	**182,922**	**1,684,782**	**802,153**	**882,629**
Rulindo	360,144	171,849	188,295	38,110	18,504	19,606	322,034	153,345	168,689
Gakenke	365,292	172,600	192,692	14,788	7,079	7,709	350,504	165,521	184,983
Musanze	476,522	227,340	249,182	234,258	113,208	121,050	242,264	114,132	128,132
Burera	387,729	184,782	202,947	38,442	18,436	20,006	349,287	166,346	182,941
Gicumbi	448,824	216,389	232,435	28,131	13,580	14,551	420,693	202,809	217,884

Source: PHC, NISR, 2022

Figure 4: Population distribution of the northern province by sex



Source: PHC, NISR, 2022

4.2.1 Rulindo district

a) Population

The 5th RPHC enumerated 360,144 residents in Rulindo district. The population of Rulindo District is predominantly female: are 188,295 women corresponding to 52.3 % of its total population. Females are predominant in all the sectors of Rulindo District (female represent more than 50% in all sectors). Shyorongi (43,744 residents), Masoro (27,311 residents), Murambi (27,283 residents) and Buyoga (24,721 residents) are the most populated sectors. They represent respectively 12.1%; 7.6% and 6.9% of the total population of Rulindo district. The two less populated sectors are Rusiga (13,452 inhabitants) and Ngoma (12,703 inhabitants). They represent 3.7% and 3.5% of the total resident population of Rulindo District respectively.

Table 5: Population of Rulindo District by Sector and sex

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Rwanda	**13,246,394**	**6,429,326**	**6,817,068**	**100**	**48.5**	**51.5**	**-**
Northern Province	**2,038,511**	**972,960**	**1,065,551**	**100**	**47.7**	**52.3**	**-**
Rulindo district	360,144	171,849	188,295	100	47.7	52.3	100.0
Base	20,528	9,574	10,954	100	46.6	53.4	5.7
Burega	13,893	6,571	7,322	100	47.3	52.7	3.9
Bushoki	23,570	11,102	12,468	100	47.1	52.9	6.5
Buyoga	24,721	11,743	12,978	100	47.5	52.5	6.9
Cyinzuzi	15,768	7,543	8,225	100	47.8	52.2	4.4
Cyungo	15,350	7,212	8,138	100	47.0	53.0	4.3
Kinihira	17,145	8,082	9,063	100	47.1	52.9	4.8

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Kisaro	23,113	11,054	12,059	100	47.8	52.2	6.4
Masoro	27,311	13,261	14,050	100	48.6	51.4	7.6
Mbogo	19,101	9,070	10,031	100	47.5	52.5	5.3
Murambi	27,283	13,293	13,990	100	48.7	51.3	7.6
Ngoma	12,703	6,061	6,642	100	47.7	52.3	3.5
Ntarabana	24,748	11,930	12,818	100	48.2	51.8	6.9
Rukozo	17,021	8,045	8,976	100	47.3	52.7	4.7
Rusiga	13,452	6,416	7,036	100	47.7	52.3	3.7
Shyorongi	43,744	21,182	22,562	100	48.4	51.6	12.1
Tumba	20,693	9,710	10,983	100	46.9	53.1	5.7

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

Rulindo district population is predominantly in rural area 89.4% while urban represents 10.6%. Most the sectors of Rulindo district are entirely rural, only 4 sectors out of 17 have a small urban area (Base, Kinihira, Murambi and Shyorongi).

b) Housing characteristics

The most common type of habitat in Rulindo district is Umudugudu (Planned rural settlement) (52.8%) followed by Dispersed/ Isolated housing (40.2%). The type of habitat varies across sectors Umudugudu (Planned rural settlement) housing is most prevalent in Cyungo (83.7%) and Rukozo (83.4%). The sectors with the high percentages of dispersed/isolated housing units are Ngoma (78.0%) and Masoro (70.9%).

Table 6: **Distribution (count and %) of households in Rulindo District by type of habitat and Sector**

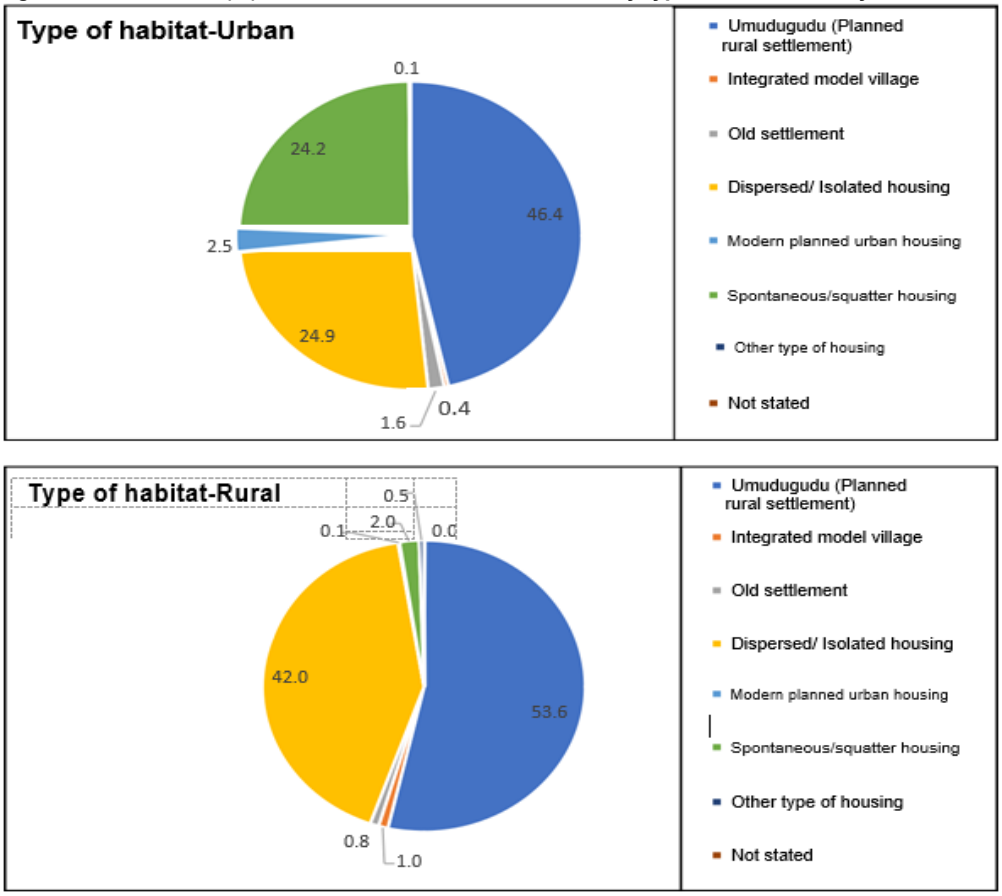
Sectors	Total Number of Households	Percentage								
		Total	Umudugudu(Planned rural settlement)	Integrated model village	Old settlement	Dispersed/Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Rwanda	**3,312,743**	**100**	**65.4**	**0.8**	**2.3**	**14.9**	**6.9**	**8.9**	**0.8**	**0.0**
Northern Province	**506,064**	**100**	**70.5**	**0.6**	**1.7**	**22.3**	**0.5**	**4.1**	**0.3**	**0.0**
Rulindo District	**91,909**	**100**	**52.8**	**0.9**	**0.9**	**40.2**	**0.4**	**4.4**	**0.4**	**0.0**
Rulindo Urban	**9,898**	**100**	**46.4**	**0.4**	**1.6**	**24.9**	**2.5**	**24.2**	**0.1**	**-**
Rulindo Rural	**82,011**	**100**	**53.6**	**1.0**	**0.8**	**42.0**	**0.1**	**2.0**	**0.5**	**0.0**
Base	5,236	100	68.9	0.2	0.2	30.0	-	0.6	0.2	0.0
Burega	3,722	100	46.8	0.1	2.1	50.6	-	0.3	0.1	0.0
Bushoki	5,932	100	68.4	2.8	0.4	26.7	0.0	1.5	0.1	-
Buyoga	6,340	100	61.2	0.7	0.8	34.3	-	0.9	2.1	-
Cyinzuzi	3,999	100	29.2	1.4	1.2	57.1	-	10.9	0.3	-
Cyungo	3,793	100	87.1	0.3	0.0	9.9	0.0	2.5	0.1	-
Kinihira	4,360	100	65.7	3.8	0.5	24.2	0.0	3.7	2.1	-
Kisaro	5,846	100	71.0	0.2	0.1	27.6	0.0	0.6	0.3	-
Masoro	6,922	100	17.8	1.4	2.5	70.9	0.0	6.2	0.4	-
Mbogo	4,868	100	54.4	0.1	2.0	42.6	0.0	0.8	0.2	-
Murambi	6,831	100	44.8	0.2	0.0	54.4	0.0	0.3	0.2	-
Ngoma	3,246	100	20.2	0.0	0.3	78.0	0.0	1.0	0.4	-
Ntarabana	6,366	100	42.0	0.9	1.8	52.7	0.0	1.9	0.3	-
Rukozo	4,268	100	83.4	0.1	0.0	16.4	0.0	0.0	0.0	-
Rusiga	3,460	100	57.0	1.1	0.4	40.8	0.0	0.7	0.0	-
Shyorongi	11,445	100	45.4	1.4	1.6	28.2	0.0	21.2	0.2	-
Tumba	5,275	100	52.8	0.0	0.2	46.5	0.0	0.3	0.1	-

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

According to the area of residence, the predominant types are Umudugudu (Planned rural settlement) housing (46.4%), Dispersed/ Isolated housing (24.9) and Spontaneous/squatter housing (24.2%) in urban areas. In rural areas, the predominant type is Umudugudu (Planned rural settlement) housing (53.6%) followed by Dispersed/

Isolated housing (42.0%).

Figure 5: Distribution (%) of households in Rulindo District by type of habitat and by area of residence.



Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

c) Appliance and assets ownership

At the district level, 83.5% of private households possess a radio, 77.8% a mobile phone, 15.4% a smartphone, 9.0% a TV and 2.2% a computer. The percentage of private households possessing a radio is high in Bushoki (88.8%), Murambi (87.8%) Mbogo (87.6%) and Rusiga (87.5%). The percentage of private households possessing a television is high in Shyorongi (22.7%) and Murambi (16.0%). Mobile phone is mostly possessed by private households of Shyorongi (84.1%), Bushoki (83.7%) and Murambi (83.0%). The sectors with high percentage of households with smartphone are Shyorongi (28.8%) Bushoki (21.3%) and Murambi (19.3%) while the percentage of households possessing this asset is low in Base (8.6%). Computer is mostly possessed in Shyorongi (4.8%).

Table 7: Percentage of private households and of Rulindo District possessing electrical appliance

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone[2]	Smart Mobile	Computer
Rwanda	**3,312,743**	**81.5**	**12.3**	**78.1**	**20.8**	**4.2**
Northern Province	**506,064**	**82.1**	**7.5**	**77.6**	**15.3**	**2.3**
Rulindo District	**91,909**	**83.5**	**9.0**	**77.8**	**15.4**	**2.2**
Base	5,236	84.0	6.1	80.5	16.6	2.2
Burega	3,722	80.0	3.3	70.7	8.6	1.0
Bushoki	5,932	88.8	8.9	83.7	21.3	2.7
Buyoga	6,340	82.2	3.7	75.4	9.8	1.4
Cyinzuzi	3,999	81.4	4.0	73.7	11.0	0.9
Cyungo	3,793	77.6	4.1	72.7	9.9	1.2
Kinihira	4,360	83.3	5.6	78.2	14.6	1.8
Kisaro	5,846	77.3	3.7	70.6	9.0	1.5
Masoro	6,922	82.3	13.1	76.2	16.9	3.0

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone[2]	Smart Mobile	Computer
Mbogo	4,868	87.6	5.8	79.7	12.0	1.8
Murambi	6,831	87.8	16.0	83.0	19.3	2.3
Ngoma	3,246	82.8	4.6	77.4	9.1	0.7
Ntarabana	6,366	81.4	10.1	75.0	15.0	2.6
Rukozo	4,268	78.5	3.7	71.9	9.7	0.9
Rusiga	3,460	85.5	5.2	78.7	11.4	1.5
Shyorongi	11,445	87.3	22.7	84.1	28.8	4.8
Tumba	5,275	84.2	4.7	78.3	13.3	1.4

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

d) Access to energy for lighting and cooking

In Rulindo district, the main source of energy for lighting used by households is electricity (54.7%) followed by Flashlight/Phone Flashlight (36%). At the sector level, the percentage of households using electricity for lighting is high in Shyorongi (69.3%), Bushoki (66.3%) and Murambi (62.0%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Kisaro (51.2%) and Rukozo (45.7%).

According to the area of residence, the sources of energy for lighting in Rulindo district are mainly electricity, and flashlight/phone flashlight. However, the percentages of households using them vary by area of residence. In urban areas, the main source of energy for lighting is electricity (75.5%) followed by flashlight/phone flashlight (15.2%). In rural areas, 52.1% of private households use electricity as main source of energy for lighting while 38.5% use flashlights/Phone.

Table 8: **Distribution (count and %) of households of Rulindo District by main source of energy for lighting**

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for Lighting	Not stated
Rwanda	**3,312,743**	**100**	**61.0**	**0.4**	**0.0**	**2.9**	**4.2**	**1.1**	**28.4**	**0.1**	**1.2**	**0.5**	**0.0**
Northern Province	**506,064**	**100**	**54.1**	**0.3**	**0.0**	**3.0**	**5.0**	**0.8**	**35.3**	**0.1**	**0.9**	**0.4**	**0.0**
Rulindo District	**91,909**	**100**	**54.7**	**0.3**	**0.0**	**4.0**	**2.9**	**0.8**	**36.0**	**0.1**	**0.9**	**0.4**	**0.0**
Rulindo Urban	**9,898**	**100**	**75.5**	**0.2**	**-**	**7.0**	**0.6**	**0.2**	**15.2**	**0.1**	**0.6**	**0.5**	**-**
Rulindo Rural	**82,011**	**100**	**52.1**	**0.3**	**0.0**	**3.6**	**3.2**	**0.9**	**38.5**	**0.1**	**0.9**	**0.4**	**0.0**
Base	5,236	100	54.0	0.3	-	3.4	3.9	0.3	36.7	0.1	0.9	0.3	0.0
Burega	3,722	100	58.1	0.2	-	3.2	3.2	0.2	33.7	0.0	0.5	0.8	0.0
Bushoki	5,932	100	66.3	0.4	-	2.3	2.6	0.1	27.4	0.1	0.6	0.2	-
Buyoga	6,340	100	49.7	0.4	-	2.9	4.0	0.9	40.0	0.1	1.7	0.4	-
Cyinzuzi	3,999	100	48.8	0.3	-	3.2	2.8	0.9	42.3	0.1	1.3	0.4	-
Cyungo	3,793	100	47.1	0.2	-	2.3	7.4	0.1	41.4	0.2	0.8	0.5	-
Kinihira	4,360	100	43.8	0.5	0.0	3.4	6.8	0.3	44.0	0.0	1.0	0.2	-
Kisaro	5,846	100	39.8	0.1	0.0	1.9	4.6	1.1	51.2	0.1	0.8	0.4	-
Masoro	6,922	100	57.4	0.2	0.2	7.9	1.0	0.9	31.5	0.1	0.6	0.3	-
Mbogo	4,868	100	56.9	0.3	0.0	1.8	2.6	1.2	36.1	0.1	0.7	0.1	-
Murambi	6,831	100	62.0	0.3	-	7.9	0.5	0.8	26.6	0.2	1.0	0.7	-
Ngoma	3,246	100	49.6	0.5	-	3.5	1.6	1.2	40.5	0.2	2.3	0.4	-
Ntarabana	6,366	100	55.3	0.2	0.1	5.3	1.5	1.9	34.2	0.1	1.1	0.3	-
Rukozo	4,268	100	44.6	0.2	-	1.3	5.7	1.7	45.7	0.0	0.5	0.1	-
Rusiga	3,460	100	50.2	0.3	0.0	2.5	0.6	2.1	43.7	0.1	0.2	0.3	-
Shyorongi	11,445	100	69.3	0.2	0.0	5.6	0.5	0.6	22.8	0.1	0.5	0.5	-
Tumba	5,275	100	47.8	0.1	-	3.0	5.5	0.3	42.3	0.0	0.6	0.4	-

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

At the district level, the main sources of energy for cooking used by the private households are firewood (87.9%) followed by charcoal (9.7%). At the sector level, firewood is the most used source of cooking energy by private households in Rukozo (98.3%), Kinihira (96.7%) and Burega (96.6%). Sectors with the high percentage of private households using charcoal as main source of cooking energy are Shyorongi (37.2%) and Murambi (17.5%). By the area of residence, the main sources of energy for cooking used by private households in Rural areas is the firewood

(93.1%) and charcoal (5.1%). In urban areas, private households use charcoal (48.2%) and firewood (45.6%).

4.2.2 Gakenke district

a) Population

Gakenke district has a total population of 365,292 residents. Its population is predominantly female: 192,692 are women corresponding to 52.8% of the total population. Females are predominant in all 19 sectors of the district. Gakenke (25,325 population) and Kamubuga (23,336 population) are the most populated sectors. They represent 6.9% and 6.4% of the total population of Gakenke district, respectively. The two less populated sectors are Karambo (13,617 inhabitants) and Minazi (14,193 inhabitants).

Table 9: **Population of Gakenke District by Sector and sex**

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Rwanda	**13,246,394**	**6,429,326**	**6,817,068**	**100**	**48.5**	**51.5**	
Northern Province	**2,038,511**	**972,960**	**1,065,551**	**100**	**47.7**	**52.3**	
Gakenke district	**365,292**	**172,600**	**192,692**	**100**	**47.2**	**52.8**	**100.0**
Busengo	21,392	10,048	11,344	100	47.0	53.0	5.9
Coko	17,942	8,673	9,269	100	48.3	51.7	4.9
Cyabingo	18,785	8,917	9,868	100	47.5	52.5	5.1
Gakenke	25,325	11,934	13,391	100	47.1	52.9	6.9
Gashenyi	22,647	10,661	11,986	100	47.1	52.9	6.2
Janja	16,007	7,423	8,584	100	46.4	53.6	4.4
Kamubuga	23,336	10,950	12,386	100	46.9	53.1	6.4
Karambo	13,617	6,318	7,299	100	46.4	53.6	3.7
Kivuruga	19,967	9,333	10,634	100	46.7	53.3	5.5
Mataba	15,520	7,397	8,123	100	47.7	52.3	4.2
Minazi	14,193	6,729	7,464	100	47.4	52.6	3.9
Mugunga	19,963	9,450	10,513	100	47.3	52.7	5.5
Muhondo	21,334	10,296	11,038	100	48.3	51.7	5.8
Muyongwe	16,053	7,461	8,592	100	46.5	53.5	4.4
Muzo	21,816	10,099	11,717	100	46.3	53.7	6.0
Nemba	16,854	7,851	9,003	100	46.6	53.4	4.6
Ruli	22,464	10,962	11,502	100	48.8	51.2	6.1
Rusasa	19,242	9,124	10,118	100	47.4	52.6	5.3
Rushashi	18,835	8,974	9,861	100	47.6	52.4	5.2

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

Gakenke district population is predominantly rural (96.0%) while urban represents 4.0%. The sectors of Gakenke district which are entirely rural are Busengo, Coko, Cyabingo, Gashenyi, Janja, Kamubuga, Karambo, Kivuruga, Mataba, Minazi, Mugunga, Muhondo, Muyongwe, Muzo, Rusasa, Rushashi.

b) Housing characteristics

In Northern Province the predominant type of habitat is Umudugudu (Planned rural settlement) (70.5%) and Dispersed/ Isolated housing (22.3%). It is in the same as in Gakenke district as one of districts of the Northern Province. The most common type of habitat in Gakenke district is Umudugudu (Planned rural settlement) (85.5%) followed by Dispersed/ Isolated housing (13.1%) and Integrated model village (0.5%). The type of habitat varies across sectors. Umudugudu (Planned rural settlement) is most prevalent in Busengo (96.9%) and Mugunga (94.4%) and low in Gashenyi (59.8%). The sectors with the highest percentages of dispersed/isolated housing units are Gashenyi (36.4%) and Muyongwe (26.7%).

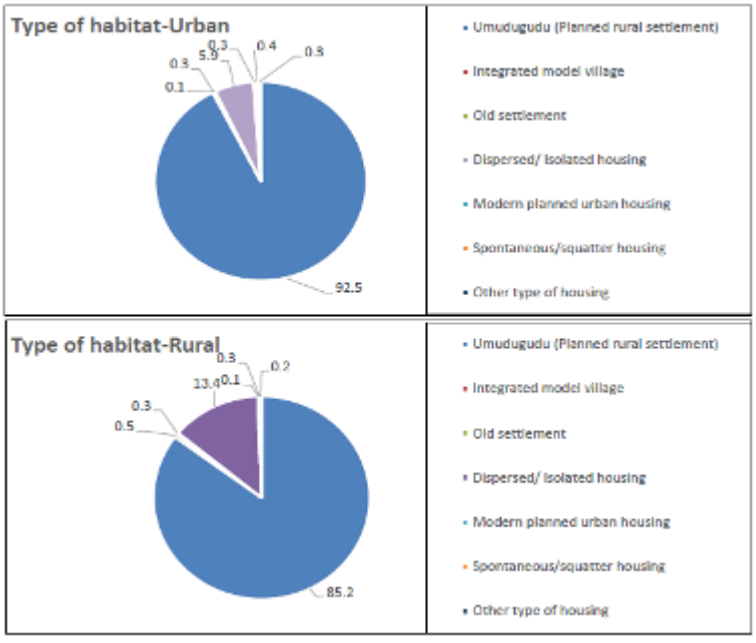
Table 10: Distribution (count and %) of households in Gakenke District by type of habitat and Sector

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu(Planned rural settlement)	Integrated model village	Old settlement	Dispersed/Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Rwanda	**3,312,743**	**100**	**65.4**	**0.8**	**2.3**	**14.9**	**6.9**	**8.9**	**0.8**	**0.0**
Northern Province	**506,064**	**100**	**70.5**	**0.6**	**1.7**	**22.3**	**0.5**	**4.1**	**0.3**	**0.0**
Gakenke District	**93,609**	**100**	**85.5**	**0.5**	**0.3**	**13.1**	**0.1**	**0.3**	**0.2**	**-**
Gakenke urban	**4,009**	**100**	**92.5**	**0.3**	**0.1**	**5.9**	**0.3**	**0.4**	**0.3**	**-**
Gakenke Rural	**89,600**	**100**	**85.2**	**0.5**	**0.3**	**13.4**	**0.1**	**0.3**	**0.2**	**-**
Busengo	5,343	100	96.9	0.2	0.3	2.5	-	0.1	0.0	-
Coko	4,598	100	93.6	0.1	0.4	5.6	0.0	0.1	0.1	-
Cyabingo	4,824	100	92.6	0.0		6.5	-	0.6	0.3	-
Gakenke	6,384	100	81.7	0.7	0.6	15.4	0.2	1.3	0.2	-
Gashenyi	5,884	100	59.8	3.2	0.2	36.4	-	0.2	0.2	-
Janja	3,937	100	89.8	0.0	0.2	9.4	0.0	0.3	0.3	-
Kamubuga	5,694	100	93.3	0.1	0.6	5.8	-	0.2	0.1	-
Karambo	3,622	100	82.6	1.0	1.1	15.0	-	0.4	-	-
Kivuruga	4,841	100	93.2	0.2	0.5	5.8	-	0.0	0.4	-
Mataba	4,085	100	86.9	0.9	0.2	11.8	-	0.2	0.0	-
Minazi	3,615	100	92.2	0.1	0.1	7.3	-	0.1	0.2	-
Mugunga	5,210	100	94.4	0.9	0.1	2.5	2.0	0.1	0.0	-
Muhondo	5,580	100	72.8	0.0	0.1	26.4	-	0.5	0.3	-
Muyongwe	4,190	100	72.6	0.1		26.7	-	0.2	0.4	-
Muzo	5,537	100	85.9	0.3	0.0	13.5	-	0.1	0.1	-
Nemba	4,365	100	81.8	0.0	0.0	17.6	-	0.1	0.4	-
Ruli	6,251	100	87.9	0.8	0.1	10.1	-	0.4	0.6	-
Rusasa	4,738	100	87.2	0.1	0.3	12.3	0.0	0.0	0.1	-
Rushashi	4,911	100	84.9	0.1	0.3	14.6	-	0.0	0.1	-

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

According to the area of residence, the predominant type is Umudugudu (Planned rural settlement) (92.5%) followed by Dispersed/ Isolated housing (5.9%) in urban areas. It is the same in rural areas, the predominant type is Umudugudu (Planned rural settlement) (85.2%) followed by Dispersed/ Isolated housing (13.4%).

Figure 6: Distribution (%) of households in Gakenke District by type of habitat and by Area of residence.



Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

c) Appliance and assets ownership

At the district level, 81.4% of private households possess a radio, 76.2% a mobile phone, 10.7% a smartphone, 3.7% a TV and 1.1% a computer. The percentage of private households possessing a radio is high in Ruli (88.8%), Coko (97.3%) and Muhondo (86.4%). It is low in Muzo (74.2%). The percentage of private households possessing a television is high in Ruli (12.5%) while it is low in Busengo (1.2%). Mobile phone is mostly possessed by private households of Ruli (84.4%), Coko (82.4%) and Kivuruga (80.5%). The sectors with high percentage of households with smartphone are Ruli (19.9%) and Gakenke (16.4%) while the percentage of households possessing this asset is low in Rusasa (6.5%). The computer is mostly possessed in Gakenke (2.8%) and Nemba, Ruli (2.2%, each).

Table 11: **Percentage of private households and of Gakenke District possessing electrical appliance**

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone[2]	Smart Mobile	Computer
Rwanda	**3,312,743**	**81.5**	**12.3**	**78.1**	**20.8**	**4.2**
Northern Province	**506,064**	**82.1**	**7.5**	**77.6**	**15.3**	**2.3**
Gakenke District	**93,609**	**81.4**	**3.7**	**76.2**	**10.7**	**1.1**
Busengo	5,343	80.4	1.2	74.2	7.8	0.6
Coko	4,598	87.1	5.0	82.4	9.5	0.4
Cyabingo	4,824	83.4	2.6	79.0	10.6	0.9
Gakenke	6,384	84.1	5.7	78.5	16.4	2.8
Gashenyi	5,884	80.8	3.5	74.3	10.4	0.7
Janja	3,937	80.3	1.9	76.4	9.1	0.5
Kamubuga	5,694	77.8	2.8	74.0	8.4	0.7
Karambo	3,622	79.4	1.5	71.0	8.3	0.5
Kivuruga	4,841	85.3	2.6	80.5	12.5	0.9
Mataba	4,085	74.5	1.5	69.4	6.6	0.7
Minazi	3,615	83.9	1.5	78.7	7.7	0.5
Mugunga	5,210	77.0	3.0	74.1	10.0	1.2
Muhondo	5,580	86.4	6.0	80.3	13.2	1.4
Muyongwe	4,190	81.4	3.0	74.6	8.9	0.6
Muzo	5,537	74.2	1.9	69.9	6.6	0.6
Nemba	4,365	79.2	4.6	73.4	12.3	2.2
Ruli	6,251	88.8	12.5	84.4	19.9	2.2
Rusasa	4,738	75.7	1.5	70.2	6.5	0.4
Rushashi	4,911	83.8	4.3	78.9	11.9	1.3

Source: Fifth Rwanda Population and Housing Census,2022(NISR

d) Access to energy for lighting and cooking

In Gakenke district, the main source of energy for lighting used by households is electricity (49.7%) followed by flashlight/phone flashlight (39.2%). At the sector level, the percentage of households using electricity for lighting is high in Muhondo (67.3%), Ruli; (65.5%) and Kivuruga (63.3%). The sectors with the highest percentages of private households using flashlight/phone flashlight for lighting are Mataba (50.5%) and Janja (50.1%). According to the area of residence, the main source of energy for lighting is electricity (78.4%) and flashlight/phone flashlight (16.0%) in urban l areas. In rural areas, 48.4% of private households use electricity as their main source of energy for lighting while 40.2% use flashlight or phone flashlight.

Table 12: **Distribution (count and %) of households of Gakenke District by main source of energy for lighting**

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for Lighting	Not stated
Rwanda	**3,312,743**	**100**	**61.0**	**0.4**	**0.0**	**2.9**	**4.2**	**1.1**	**28.4**	**0.1**	**1.2**	**0.5**	**0.0**
Northern Province	**506,064**	**100**	**54.1**	**0.3**	**0.0**	**3.0**	**5.0**	**0.8**	**35.3**	**0.1**	**0.9**	**0.4**	**0.0**
Gakenke District	**93,609**	**100**	**49.7**	**0.3**	**-**	**1.2**	**6.9**	**1.1**	**39.2**	**0.1**	**1.1**	**0.4**	**0.0**

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for Lighting	Not stated
Gakenke Urban	**4,009**	**100**	**78.4**	**0.1**	**-**	**1.5**	**1.8**	**1.1**	**16.0**	**0.0**	**0.7**	**0.4**	
Gakenke Rural	**89,600**	**100**	**48.4**	**0.3**	**-**	**1.2**	**7.1**	**1.1**	**40.2**	**0.1**	**1.1**	**0.4**	**0.0**
Busengo	5,343	100	45.6	0.2	-	0.6	10.6	0.8	40.7	0.1	0.9	0.4	-
Coko	4,598	100	51.4	0.3	-	0.8	3.1	4.3	39.4	0.1	0.4	0.1	-
Cyabingo	4,824	100	52.4	0.6	-	1.7	3.3	0.1	40.0		1.5	0.4	-
Gakenke	6,384	100	49.1	0.5	-	1.6	4.6	1.0	41.1	0.1	1.0	1.1	-
Gashenyi	5,884	100	49.1	0.1	-	1.1	4.0	0.2	44.3	0.2	0.8	0.2	-
Janja	3,937	100	31.3	0.1	-	1.4	14.0	0.8	50.1	0.3	1.5	0.5	-
Kamubuga	5,694	100	57.7	0.2	-	0.5	10.6	0.4	29.6	0.1	0.6	0.4	-
Karambo	3,622	100	48.6		-	1.2	3.0	2.5	43.3	0.1	0.7	0.7	-
Kivuruga	4,841	100	63.3	0.2	-	1.2	5.3	0.4	27.4	0.1	1.8	0.2	0.0
Mataba	4,085	100	32.4	0.5	-	1.4	14.2	0.3	50.5	0.1	0.5	0.1	-
Minazi	3,615	100	49.7	0.1	-	0.7	3.6	3.2	41.1	0.2	0.8	0.6	-
Mugunga	5,210	100	49.4	0.8	-	2.2	11.0	1.7	31.8	0.2	2.7	0.1	-
Muhondo	5,580	100	67.3	0.1	-	0.6	0.9	0.4	29.8	0.3	0.4	0.3	-
Muyongwe	4,190	100	46.5	0.3	-	1.5	3.2	1.1	46.2	0.1	0.8	0.4	-
Muzo	5,537	100	32.3	0.4	-	1.0	15.6	0.6	49.0	0.3	0.4	0.5	-
Nemba	4,365	100	43.3	0.3	-	0.9	7.9	0.4	44.1	0.1	1.8	1.3	-
Ruli	6,251	100	65.5	0.2	-	1.6	0.9	1.9	29.2	0.1	0.5	0.1	-
Rusasa	4,738	100	40.4	0.3	-	2.4	11.9	1.7	40.0	0.1	2.8	0.4	-
Rushashi	4,911	100	55.1	0.8	-	1.2	4.3	0.7	36.6	0.1	0.6	0.5	-

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

At the district level, the main sources of energy for cooking used by the private households are firewood (96.6%) followed by charcoal (2.2%). At the sector level, firewood is the most used source of cooking energy by private households in Muzo (98.8%), Busengo and Karambo (98.6%, each). Sectors with the high percentage of private households using charcoal are found in Gakenke (7.3%) and Ruli (6.9%). By area of residence, private households use mostly firewood (97.5%) and charcoal (1.4%) in rural areas. In urban areas, private households use most firewood (75.0%) and charcoal (20.4%).

4.2.3 Musanze district

a) Population

Musanze accounts 476,522 residents which represent 23.4% % of the total population of the Northern Province (2,038,511 residents). The population of Musanze district is predominantly female: 249,182 are women corresponding to 52.3 % of the total population of Musanze district. Females are predominant in all sectors of the district except Muhoza sector with 49.4%. Muhoza (69,741 population), Cyuve (62,179 population), and Musanze (47,720 population) are the most populated sectors. They represent 14.6%, 13%, and 10% of the total population of Musanze district, respectively. The two less populated sectors are Gashaki (14,272 inhabitants) and Nkotsi (17,349 inhabitants). They represent 3% and 3.6% of the total resident population of Musanze district, respectively.

Table 13: **Population of Musanze District by Sector and sex**

Sectors	Counts			Percent			Population share (%)
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Rwanda	**13,246,394**	**6,429,326**	**6,817,068**	**100**	**48.5**	**51.5**	**-**
Northern Province	2,038,511	972,960	1,065,551	100	47.7	52.3	-
Musanze	476,522	227,340	249,182	100	47.7	52.3	100
Busogo	28,264	13,290	14,974	100	47	53	5.9
Cyuve	62,179	29,347	32,832	100	47.2	52.8	13
Gacaca	30,719	14,591	16,128	100	47.5	52.5	6.4
Gashaki	14,272	6,761	7,511	100	47.4	52.6	3
Gataraga	26,721	12,686	14,035	100	47.5	52.5	5.6
Kimonyi	21,681	10,114	11,567	100	46.6	53.4	4.5
Kinigi	32,297	15,423	16,874	100	47.8	52.2	6.8
Muhoza	69,741	35,311	34,430	100	50.6	49.4	14.6
Muko	26,472	12,496	13,976	100	47.2	52.8	5.6
Musanze	47,720	22,478	25,242	100	47.1	52.9	10
Nkotsi	17,349	8,108	9,241	100	46.7	53.3	3.6
Nyange	31,274	14,612	16,662	100	46.7	53.3	6.6
Remera	19,987	9,522	10,465	100	47.6	52.4	4.2
Rwaza	23,120	10,998	12,122	100	47.6	52.4	4.9
Shingiro	24,726	11,603	13,123	100	46.9	53.1	5.2

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

Musanze district population is predominantly rural (50.8%) while urban represents 49.2%. The sectors of Musanze district which are almost urban are Muhoza, Kimonyi, Busogo, and Cyuve. Gashaki and Remera Sectors are entirely rural while Rwaza, Shingiro, Gacaca, and Kinigi sectors are almost rural.

b) Housing characteristics

the most common type of habitat in Musanze district is Umudugudu (Planned rural settlement) (76.4%) followed by Spontaneous/squatter housing (9.3%) and dispersed or isolated housing (7.7%). The type of habitat varies across sectors. Umudugudu (Planned rural settlement) is most prevalent in Kinigi sector (98.1%), and low in Kimonyi sector (23.2%).

Table 14: Distribution (count and %) of households in Musanze District by type of habitat and Sector

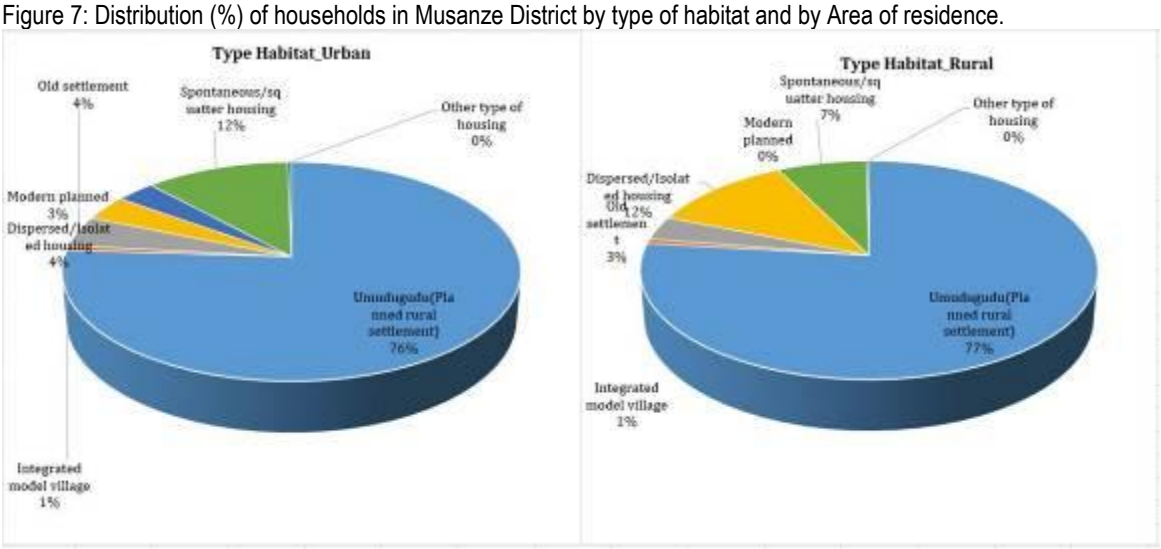
Sectors	Total Number of Households	Percentage								
		Total	Umudugudu (Planned rural settlement	Integrated model village	Old settlement	Dispersed/ Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Rwanda	**3,312,743**	**100**	**65.4**	**0.8**	**2.3**	**14.9**	**6.9**	**8.9**	**0.8**	**-**
Northern Province	**506,064**	**100**	**70.5**	**0.6**	**1.7**	**22.3**	**0.5**	**4.1**	**0.3**	**0**
Musanze District	**119,387**	**100**	**76.4**	**0.7**	**4**	**7.7**	**1.6**	**9.3**	**0.2**	0
Musanze urban	58,426	100	75.9	0.7	4.5	3.7	3.2	11.6	0.3	0
Musanze Rural	60,961	100	76.8	0.7	3.5	11.6	0	7.2	0.2	0
Busogo	6,940	100	77.5	0.1	4.4	7.8	2.5	7.6	0.1	0
Cyuve	15,444	100	84.6	0.5	1	1.7	7	5	0.3	
Gacaca	7,384	100	93.4	1	3.5	2	0	0.1	0.1	
Gashaki	3,460	100	94.9	1.8		1.8		1.4	0.1	
Gataraga	6,333	100	25.5	1	8.6	52	0	12.6	0.1	
Kimonyi	5,629	100	23.2	0.1	0.6	19.7	0	56.4	0.1	
Kinigi	8,201	100	98.1	1.9	0	0			0	
Muhoza	16,900	100	79	1	5.7	2	2.4	9	0.7	0
Muko	6,937	100	53	0.2	21.1	24.8	0.1	0.8	0	
Musanze	12,335	100	58.9	0.1	3.4	2.4	1.6	33.4	0.2	
Nkotsi	4,556	100	92	0.2	0.3	6.9		0.6	0	

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu (Planned rural settlement	Integrated model village	Old settlement	Dispersed/ Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Nyange	8,174	100	97.2	0.1	2.3	0.2	0.1	0	0	
Remera	4,953	100	93	2.5	0.3	3.9		0.2	0.1	
Rwaza	6,044	100	92.7	1.4	1.7	3.4		0.7	0.1	
Shingiro	6,097	100	81.2	0.2	5.3	11.6		0.7	1	

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

By area of residence, in urban areas, the predominant types are umudugudu/Planned rural settlement (75.9%) and Spontaneous/squatter housing (11.6%). In rural areas it is the same, the predominant type is umudugudu/Planned rural settlement (76.8%) followed by Dispersed/ Isolated housing (11.6%).

Figure 7: Distribution (%) of households in Musanze District by type of habitat and by Area of residence.



Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

c) Appliance and assets ownership

At the district level, 84.7% of private households possess a radio, 81.6% a mobile phone, 24.1% a smartphone, 13.4% a TV and 5.1% a computer. The percentage of private households possessing a radio is high in Muhoza (93.5%), and it is low in Shingiro (75.1%). The percentage of private households possessing a television is high in Muhoza (34.6%) and Cyuve (23.5%) while it is low in Rwaza, Remera, and Shingiro sectors (about 3% each). Mobile phone is mostly possessed by private households of Muhoza sector (91.1%). The sectors with high percentage of households with smartphone is Muhoza (53.1%), while the percentage of households possessing this asset is low in Rwaza and Shingiro sectors (8% each). The computer is mostly possessed in Muhoza (15.9%).

Table 15: Percentage of private households and of Musanze District possessing electrical appliance

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone	Smart Mobile	Computer
Rwanda	**3,312,743**	**81.5**	**12.3**	**78.1**	**20.8**	**4.2**
Northern Province	506,064	82.1	7.5	77.6	15.3	2.3
Musanze	119,387	84.7	13.4	81.6	24.1	5.1
Busogo	6,940	86.3	12.8	84.0	29.7	3.9
Cyuve	15,444	88.2	23.5	86.1	37.5	9.3
Gacaca	7,384	82.2	5.7	76.7	11.7	1.3
Gashaki	3,460	83.9	4.1	78.2	11	0.6
Gataraga	6,333	79.9	5.7	77.3	12.8	1.4
Kimonyi	5,629	82.1	10.5	78.9	18.5	3.5
Kinigi	8,201	84.9	10.1	82.9	18.4	1.9
Muhoza	16,900	93.5	34.6	91.1	53.1	15.9
Muko	6,937	81.6	8.2	76.6	15	1.9

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone	Smart Mobile	Computer
Musanze	12,335	83.4	11.9	81.5	23.1	5.8
Nkotsi	4,556	79.7	4.8	74.5	12.7	1.4
Nyange	8,174	81.8	6.6	79.9	15.5	1.3
Remera	4,953	85.0	3.1	80.0	12.6	0.5
Rwaza	6,044	82.7	3.2	77.9	8.8	0.8
Shingiro	6,097	75.1	2.8	72.4	8.2	0.8

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

d) Access to energy for lighting and cooking

In Musanze district, the main source of energy for lighting used by households is electricity (62.9%). At the sector level, the percentage of households using electricity for lighting is high in Muhoza (88.0%), Gashaki (74.4%), Remera (72.7%), and Busogo sectors (72.3%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Shingiro (53.7%), and Gataraga (44.7%). According to the area of residence, in urban areas, the main source of energy for lighting is electricity (77.8%), followed by flashlight/phone flashlight (14.0%) and candles (5.2%). In rural areas, 48.6% of private households use electricity as main source of energy for lighting while 37.8% use flashlight, 7.2% use firewood, and 4.1% use candles.

Table 16: Distribution (count and %) of households of Musanze District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for	Not stated
Rwanda	**3,312,743**	**100**	**61.0**	**0.4**	**0.0**	**2.9**	**4.2**	**1.1**	**28.4**	**0.1**	**1.2**	**0.5**	**0.0**
Northern Province	506,064	100	54.1	0.3	0.0	3.0	5.0	0.8	35.3	0.1	0.9	0.4	0.0
Musanze District	119,387	100	63	0.2	0.0	5	5	0.2	26.1	0.1	1	0.3	0.0
Musanze Urban	58,426	100	78	0.2	0.0	5	2	0.2	14	0.1	1	0.2	0.0
Musanze Rural	60,961	100	49	0.3	0.0	4	7	0.3	37.8	0.1	1	0.5	0.0
Busogo	6,940	100	72	0.2		3	5	0.0	17.5	0.0	1	0.9	0.0
Cyuve	15,444	100	68	0.1	0.0	8	2	0.3	21.1	0.1	1	0.3	
Gacaca	7,384	100	66	0.2	0	4.0	4	0.4	23.8	0.1	1	0.3	
Gashaki	3,460	100	74	0.0		1.0	4	0.3	19.2		1	0.0	
Gataraga	6,333	100	38	0.4		4	11	0.1	44.7	0.1	2	0.0	
Kimonyi	5,629	100	60	0.3		3	3	0.2	31.8	0.1	1	0.5	
Kinigi	8,201	100	54	0.2	0.0	5	5	0.2	35.1	0.1	1	0.3	
Muhoza	16,900	100	88.0	0.3	0.0	5	1	0.2	4.9	0.0	1	0.1	0.0
Muko	6,937	100	66	0.2	0.0	6	4	0.3	21.3		1	0.0	
Musanze	12,335	100	55	0.1	0.0	7	6	0.2	31.0	0.2	1	0.3	
Nkotsi	4,556	100	59	0.2		1	5	0.2	32.7	0.2	2	0.2	
Nyange	8,174	100	52.0	0.1	0.0	5.0	7	0.4	34.5	0.1	1	0.1	
Remera	4,953	100	73	0.1		2	2	0.2	21.6	0.0	1	0.2	
Rwaza	6,044	100	58	0.4	0.0	2	3	0.4	33.4	0.1	1	0.0	
Shingiro	6,097	100	29	0.2		3	##	0.4	53.7	0.1	2	0.2	

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

The main sources of energy for cooking used by the private households are firewood (73.9%) followed by charcoal (21.0%) and gas (4.0%). At the sector level, firewood is the most used source of cooking energy by private households in Remera (98.2%) and Gashaki (98.0%). The sector with the high percentage of private households using charcoal as main source of cooking energy is Muhoza (55.1%). Sectors with the highest percentages of private households using gas as main source of cooking energy are Muhoza (16.4%), and Cyuve (7.0%).

4.2.4 Burera district

a) Population

Burera district counts 387,729 residents predominantly female: 202,947 are women corresponding to 52.3% of its total population. Females are predominant in all sectors of Burera district: Butaro (51.7%), Cyanika (52%), Kagogo

(52%), Gatebe (52.8%), Nemba (53.3%), Ruhumde 52.7 and Rwerere (52.6% respectively. The two less populated sectors are Gitovu (11,531 inhabitants) and Cyeru (14,719 inhabitants). They represent 3% and 3.8% of the total resident population of BURERA district, respectively.

Table 17: Population of Burera District by Sector and sex

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Rwanda	**13,246,394**	**6,429,326**	**6,817,068**	**100**	**48.5**	**51.5**	
North province	**2,038,511**	**972,960**	**1,065,551**	**100**	**47.7**	**52.3**	
Burera district	**387,729**	**184,782**	**202,947**	**100**	**47.7**	**52.3**	**100**
Bungwe	16,322	7,712	8,610	100	47.2	52.8	4.2
Butaro	38,013	18,352	19,661	100	48.3	51.7	9.8
Cyanika	44,510	21,362	23,148	100	48	52	11.5
Cyeru	14,719	7,020	7,699	100	47.7	52.3	3.8
Gahunga	28,059	13,282	14,777	100	47.3	52.7	7.2
Gatebe	18,867	8,900	9,967	100	47.2	52.8	4.9
Gitovu	11,531	5,516	6,015	100	47.8	52.2	3
Kagogo	23,089	11,084	12,005	100	48	52	6
Kinoni	19,017	9,093	9,924	100	47.8	52.2	4.9
Kinyababa	23,746	11,281	12,465	100	47.5	52.5	6.1
Kivuye	18,057	8,609	9,448	100	47.7	52.3	4.7
Nemba	21,401	10,002	11,399	100	46.7	53.3	5.5
Rugarama	27,051	13,046	14,005	100	48.2	51.8	7
Rugengabari	20,920	9,768	11,152	100	46.7	53.3	5.4
Ruhunde	20,157	9,528	10,629	100	47.3	52.7	5.2
Rusarabuye	20,659	9,991	10,668	100	48.4	51.6	5.3
Rwerere	21,611	10,236	11,375	100	47.4	52.6	5.6

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

Burera district population is predominantly rural area (90.1%) while urban represents 9.9%. The sectors of Burera district which don't have urban areas are Bungwe, Cyeru, Gitovu, Kinyababa, Nemba, Rugengabari, Ruhunde and Rwerere. The sectors with less urban areas are Kinoni (50.3%) and Gahunga (79.2%).

b) Housing characteristics

Umudugudu/planned rural housing is much higher in Burera district (83.9%) as one of districts of the North province. Another common type of habitat in Burera district is Dispersed/ Isolated housing (12.1%). The type of habitat varies across sectors. Planned rural settlement or housing is much higher in Gahunga (99.3%), followed by Gitovu (99.2%). Dispersed/isolated housing is 40.8% and Nemba 40.6%.

Table 18: Distribution (count and %) of households in Burera District by type of habitat and Sector

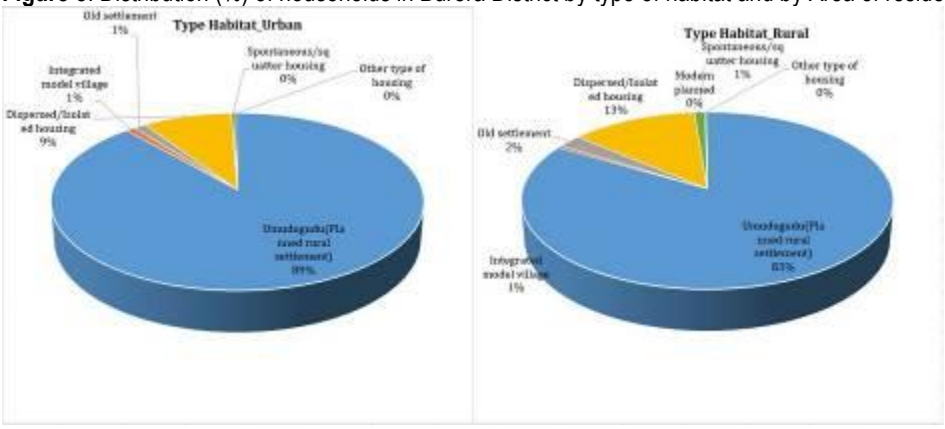
Sectors	Total Number of Households	Percentage								
		Total	Umudugudu (Planned rural settlement)	Integrated model village	Old settlement	Dispersed/Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Rwanda	**3,312,743**	**100**	**65.4**	**0.8**	**2.3**	**14.9**	**6.9**	**8.9**	**0.8**	**-**
Northern Province	**506,064**	**100**	**70.5**	**0.6**	**1.7**	**22.3**	**0.5**	**4.1**	**0.3**	**0**
Burera District	**91,786**	**100**	**83.9**	**0.6**	**2.2**	**12.1**	**0**	**1**	**0.2**	**0**
Burera Urban	9,158	100	88.5	0.9	1.2	8.8		0.3	0.3	
Burera Rural	82,628	100	83.4	0.5	2.3	12.5	0	1.1	0.2	0
Bungwe	3,956	100	78.7	0.2	12.6	8.3		0.1	0.2	
Butaro	8,727	100	81.3	1	4.2	11.5		1.4	0.7	
Cyanika	10,238	100	89.6	0.3	3.1	6.4		0.6	0.1	
Cyeru	3,559	100	80.6	0.1	1.7	17.6		0.1		

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu (Planned rural settlement)	Integrated model village	Old settlement	Dispersed/Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Gahunga	6,652	100	99.3	0.1	0	0.3	0	0.1	0.1	0
Gatebe	4,675	100	88.5	0	1	7.3		3.1		
Gitovu	2,751	100	99.2	0	0.1	0.5		0	0.1	
Kagogo	5,290	100	85.2	1.2	1.7	7.9	0	3.8	0.2	
Kinoni	4,653	100	52.8	0.2	4.2	40.8		1.9	0.1	
Kinyababa	5,453	100	67.3	2.4	5.2	24.1	0.1	0.5	0.4	
Kivuye	4,117	100	88.8	0	0.1	11.1		0.1		
Nemba	5,271	100	55.1	0.3	1.2	40.6	0	2.8	0	
Rugarama	6,365	100	88.5	1.7	0.8	8.7		0	0.3	
Rugengabari	5,032	100	90.6	0.4	0.1	6.6		2.2	0.1	
Ruhunde	5,076	100	82.1	0.6	0.4	16.8	0			
Rusarabuye	4,870	100	97.7	0.2	0.7	1.1		0.2	0.2	
Rwerere	5,101	100	97.3	0.1	0.1	2.4			0	0

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

By area of residence, in urban areas, the predominant the planned rural settlement housing (88.5%) and Dispersed/ Isolated housing (8.8%) while in rural areas, the planned rural settlement represents 83.4%, while dispersed/isolated housing represents 12.5%.

Figure 8: Distribution (%) of households in Burera District by type of habitat and by Area of residence.



Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

c) Appliance and assets ownership

At the district level, 81% of private households possess a radio, 77.6% a mobile phone, 11.4% a smartphone, 4.1% has TV and 1.1% a computer. The percentage of private households possessing a radio is high in Kinoni (85.2%), Kivuye (84.1%) and Butaro (83.6%) and all others have between 77% to 83%. The percentage of private households possessing a television is high in Kinoni (6.8%) and Bungwe 5.6%, Gahunga and Rugarama 5.2% and 5.0% respectively. The private households with mobile phone are high in Kinoni, Kagogo and Butaro at 81%, Kivuye at 79.5% and all sectors varies from 72 to 80%. Private households possessing smart phones are high in Kinoni at 14,6%, followed by Cyanika13,9%, Rugarama 14%, Kagogo and Kivuye at 12.9%. The private households for all sectors have at least one percent of the computer.

Table 19: Percentage of private households and of Burera District possessing electrical appliance

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone10	Smart Mobile	Computer
Rwanda	**3,312,743**	**81.5**	**12.3**	**78.1**	**20.8**	**4.2**
Northern Province	506,064	82.1	7.5	77.6	15.3	2.3
Burera District	91,786	81.2	4.1	77.6	11.4	1.1

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone10	Smart Mobile	Computer
Bungwe	3,956	82.2	5.6	79.4	11.9	1.1
Butaro	8,727	83.6	3.6	80.7	12.1	1.4
Cyanika	10,238	81.0	4.8	79.8	13.9	1.3
Cyeru	3,559	81.1	4.3	75.6	9.9	1.0
Gahunga	6,652	77.8	5.2	75.5	11.1	1.4
Gatebe	4,675	81.2	3.6	74.3	8.7	0.6
Gitovu	2,751	80.8	2.3	74.8	9.5	0.6
Kagogo	5,290	82.6	4.3	80.5	12.9	1.1
Kinoni	4,653	85.2	6.8	80.8	14.6	1.4
Kinyababa	5,453	81.7	3.2	79.4	12.3	0.7
Kivuye	4,117	84.1	4.3	79.5	12.9	1.2
Nemba	5,271	78.7	3.1	73.4	9.0	1.0
Rugarama	6,365	80.9	5.0	79.2	14.0	1.1
Rugengabari	5,032	76.7	2.1	72.0	8.1	0.7
Ruhunde	5,076	78.5	2.7	72.3	6.4	0.7
Rusarabuye	4,870	83.4	3.7	79.0	11.4	1.3
Rwerere	5,101	82.2	3.9	77.7	9.6	1.1

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

d) Access to energy for lighting and cooking

The main source of energy for lighting used by households is electricity (52.7%). At the sector level, the percentage of households using electricity for lighting is high in Rusarabuye (70.8%), Kivuye (69%), Kinoni (67.3%) and Butaro which has 64.7%. The sectors with the percentages of private households using flashlight/phone flashlight for lighting are Ruhunde (49.7%), Gatebe (46.3%), Cyanika (46.1%), and Gahunga (45.8%).

According to the area of residence, the main source of energy for lighting is electricity (50.8%), followed by flashlight/phone flashlight (36.6%) and firewoods (8.3%) in rural areas. In urban areas, 69% of private households use electricity as main source of energy for lighting while use 24.9% use flashlight or phone flashlight.

Table 20: Distribution (count and %) of households of Burera District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewoods	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for	Not stated
Rwanda	**3,312,743**	**100**	**61.0**	**0.4**	**0.0**	**2.9**	**4.2**	**1.1**	**28.4**	**0.1**	**1.2**	**0.5**	**0.0**
Northern Province	**506,064**	**100**	**54.1**	**0.3**	**0.0**	**3.0**	**5.0**	**0.8**	**35.3**	**0.1**	**0.9**	**0.4**	**0.0**
Burera District	**91,786**	**100**	**52.7**	**0.2**	**0.0**	**1.8**	**7.7**	**0.4**	**35.4**	**0.1**	**1.3**	**0.5**	**0.0**
Burera Urban	**9,158**	**100**	**69.0**	**0.3**		**1.7**	**2.2**	**0.1**	**24.9**	**0.1**	**1.4**	**0.4**	
Burera Rural	**82,628**	**100**	**50.8**	**0.2**	**0.0**	**1.8**	**8.3**	**0.5**	**36.6**	**0.1**	**1.2**	**0.5**	**0.0**
Bungwe	3,956	100	52.1	0.3	0.0	1.5	6.8	0.1	38.1	0.1	0.3	0.7	
Butaro	8,727	100	64.7	0.1		1.3	8.7	0.7	23.0	0.1	0.9	0.5	
Cyanika	10,238	100	44.6	0.5	0.0	2.7	1.9	0.2	46.1	0.1	3.7	0.3	
Cyeru	3,559	100	54.5	0.1	0.1	1.5	11.2	0.1	31.0	0.0	0.8	0.7	
Gahunga	6,652	100	39.2	0.2		2.7	9.2	0.1	45.8	0.1	1.3	1.5	0.0
Gatebe	4,675	100	41.6	0.1	0.0	1.4	8.6	0.5	46.3	0.0	1.1	0.4	
Gitovu	2,751	100	46.9	0.1	0.0	1.6	14.6	0.3	33.6	0.1	1.1	1.6	
Kagogo	5,290	100	49.2	0.2		1.2	3.8	0.5	43.8	0.1	1.2	0.2	
Kinoni	4,653	100	67.3	0.2		1.4	2.3	0.0	27.8	0.1	0.6	0.2	
Kinyababa	5,453	100	59.9	0.1		0.9	9.5	0.1	28.3	0.0	1.0	0.2	
Kivuye	4,117	100	69.0	0.0		2.0	7.2	0.1	21.2	0.1	0.3	0.2	
Nemba	5,271	100	53.7	0.1		2.5	9.9	1.1	31.3	0.1	0.8	0.5	
Rugarama	6,365	100	46.9	0.3		3.5	3.4	0.4	43.4	0.1	1.7	0.3	
Rugengabari	5,032	100	41.3	0.4		0.7	17.0	1.0	37.9	0.0	1.5	0.3	
Ruhunde	5,076	100	40.3	0.3		2.3	5.0	1.0	49.7	0.3	0.9	0.2	

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewoods	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for	Not stated
Rusarabuye	4,870	100	70.8	0.1		0.8	9.5	0.5	16.9	0.0	0.8	0.6	
Rwerere	5,101	100	59.9	0.2	0.0	0.7	11.9	0.3	25.9	0.1	0.4	0.5	0.0

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

In Burera district, the main cooking source of energy used are firewood 93.4% followed by charcoal 3.3% and crop waste at 2.4%. At the sector level, firewood is the most used source of cooking energy by private households in Rugengabari (98.2%), Gitovu (98.1%) and Nemba (97.8%) but almost all sectors are using over 90% of firewood in Burera sectors. Sectors with the Low percentage of private households using firewood as main source of cooking energy is Kinoni (69%) with high percentage use of crop waste of 27%.

4.2.5 Gicumbi district

a) Population

Gicumbi district accounts 448,824 residents which represent 22.0% of the total population of the Northern Province (2,038,511 residents). The population of Gicumbi district is predominantly female: 232,435 are female corresponding to 51.8% of the total population of Gicumbi district. The results in previous table 1.1 indicates that, the population share of Gicumbi district is 3.4% of the total Rwandan population and 22.0% of the total residents of the Northern Province.

Females are predominant in all sectors of Gicumbi district, except Nyankenke sector where females represent 45.4%. The most populated sectors in Gicumbi district are: Byumba sector with 43,134 residents; representing 9.6% of the total population of the district and Rukomo sector with 28,127 residents; representing 6.3% of the total population of the district while the least populated sectors are: Rwamiko with 14,821 residents representing 3.3% of the total population of the district and Rubaya with 12,044 residents; representing 2.7% of the total residents of the district.

Table 21: Population of Gicumbi District by Sector and sex

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Rwanda	**13,246,394**	**6,429,326**	**6,817,068**	**100**	**48.5**	**51.5**	
Northern Province	**2,038,511**	**972,960**	**1,065,551**	**100**	**47.7**	**52.3**	
Gicumbi district	**448,824**	**216,389**	**232,435**	**100**	**48.2**	**51.8**	**100.0**
Bukure	20,454	9,943	10,511	100	48.6	51.4	4.6
Bwisige	17,274	8,229	9,045	100	47.6	52.4	3.8
Byumba	43,134	20,372	22,762	100	47.2	52.8	9.6
Cyumba	17,218	8,158	9,060	100	47.4	52.6	3.8
Giti	17,431	8,495	8,936	100	48.7	51.3	3.9
Kageyo	20,888	9,887	11,001	100	47.3	52.7	4.7
Kaniga	16,772	8,056	8,716	100	48.0	52.0	3.7
Manyagiro	22,635	10,933	11,702	100	48.3	51.7	5.0
Miyove	20,223	9,510	10,713	100	47.0	53.0	4.5
Mukarange	18,543	8,831	9,712	100	47.6	52.4	4.1
Muko	20,050	9,656	10,394	100	48.2	51.8	4.5
Mutete	27,517	12,960	14,557	100	47.1	52.9	6.1
Nyamiyaga	20,939	10,040	10,899	100	47.9	52.1	4.7
Nyankenke	27,183	14,830	12,353	100	54.6	45.4	6.1
Rubaya	12,044	5,801	6,243	100	48.2	51.8	2.7
Rukomo	28,127	13,486	14,641	100	47.9	52.1	6.3
Rushaki	15,048	7,102	7,946	100	47.2	52.8	3.4
Rutare	27,837	13,371	14,466	100	48.0	52.0	6.2
Ruvune	21,990	10,606	11,384	100	48.2	51.8	4.9
Rwamiko	14,821	7,163	7,658	100	48.3	51.7	3.3

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Shangasha	18,696	8,960	9,736	100	47.9	52.1	4.2

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

Gicumbi district population is predominantly made of rural residents that represent 93.7% while urban residents represent 7.3%. Almost all sectors of Gicumbi district are entirely rural except Byumba, Kageyo and Rukomo. The district has no sector that is entirely urban.

b) Housing characteristics

In the Northern Province the predominant types of habitats are planned rural settlement (70.5%) and dispersed/isolated housing (22.3%). These types of habitats are also more frequent in Gicumbi district where planned rural settlements represent 54.8% while dispersed/isolated housing represent 39.6%. Across sectors, dispersed/isolated housing units are more frequent in Nyankenke (86.2%) and Rushaki (76.9%) while they are less frequent in Rubaya (5.4%) and Cyumba (10.6%). These last two sectors are on top in having modern rural planned housing with 91.6% and 77.2%: respectively. Modern planned urban housing units are found in Byumba (2.2%) and Kageyo (2.1%) and, represent a negligible share in other sectors having rural areas.

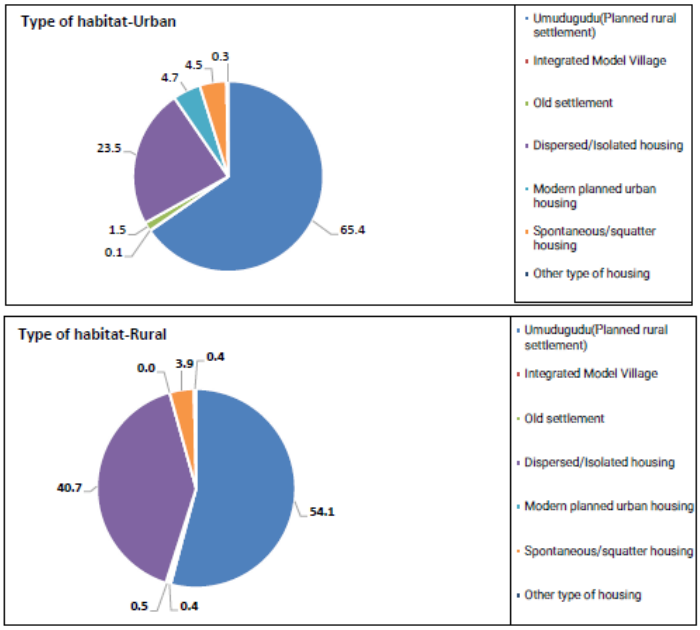
Table 22: Distribution (count and %) of households in Gicumbi District by type of habitat and Sector

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu(Planned rural settlement)	Integrated model village	Old settlement	Dispersed/Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Rwanda	**3,312,743**	**100**	**65.4**	**0.8**	**2.3**	**14.9**	**6.9**	**8.9**	**0.8**	**0.0**
Northern Province	**506,064**	**100**	**70.5**	**0.6**	**1.7**	**22.3**	**0.5**	**4.1**	**0.3**	**0.0**
Gicumbi District	**109,373**	**100**	**54.8**	**0.4**	**0.5**	**39.6**	**0.3**	**4.0**	**0.4**	**0.0**
Bukure	4,774	100	76.0	0.5	0.4	20.2	0.0	2.7	0.2	0.0
Bwisige	4,328	100	68.4	0.3	0.5	29.6	0.0	1.0	0.2	0.0
Byumba	10,762	100	61.9	1.5	2.1	28.4	2.2	3.7	0.2	0.0
Cyumba	4,203	100	77.2	0.0	0.6	10.6	0.0	11.5	0.0	0.0
Giti	4,164	100	75.9	1.1	0.1	22.2	0.0	0.5	0.1	0.0
Kageyo	4,994	100	42.1	0.1	0.3	51.3	2.1	4.1	0.0	0.0
Kaniga	4,003	100	27.5	0.1	1.3	64.6	0.0	6.5	0.0	0.0
Manyagiro	5,479	100	61.0	0.1	0.7	35.6	0.0	2.6	0.0	0.0
Miyove	5,138	100	73.9	0.0	0.2	25.7	0.0	0.2	0.0	0.0
Mukarange	4,431	100	61.7	0.1	0.0	37.0	0.0	0.9	0.3	0.0
Muko	5,054	100	52.5	0.0	0.5	33.0	0.0	13.3	0.7	0.0
Mutete	6,990	100	43.6	0.1	0.6	49.8	0.0	4.2	1.7	0.0
Nyamiyaga	5,056	100	74.4	0.1	0.1	24.4	0.0	0.9	0.1	0.0
Nyankenke	5,846	100	13.7	0.1	0.0	86.2	0.0	0.0	0.0	0.0
Rubaya	2,954	100	91.6	1.8	0.0	5.4	0.0	1.2	0.1	0.0
Rukomo	6,921	100	45.0	0.0	0.2	52.4	0.0	2.2	0.1	0.0
Rushaki	3,644	100	14.2	0.1	0.0	76.9	0.0	8.6	0.1	0.0
Rutare	6,904	100	54.8	0.3	0.2	34.4	0.0	9.9	0.5	0.0
Ruvune	5,583	100	50.6	0.3	0.3	43.4	0.0	4.8	0.5	0.0
Rwamiko	3,623	100	48.0	0.4	0.8	46.7	0.0	1.2	2.9	0.0
Shangasha	4,522	100	51.1	0.4	0.1	46.1	0.0	2.3	0.0	0.0

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

The type of habitat in Gicumbi district varies according to the area of residence. In both urban and rural areas, the predominant types are planned rural settlement and dispersed/isolated housing, but with disproportionate shares. In urban areas, planned rural settlements represent 65.4% while in rural areas, they represent 54.1%. Dispersed/isolated housing represent 23.5% in urban areas while they represent 40.7% in urban areas. Spontaneous/squatter housing represent 4.5% in urban areas and 3.9% in rural areas. No modern planned urban housing is observed in rural areas while in urban areas, it represents 4.7%.

Table 23: Distribution (%) of households in Gicumbi District by type of habitat and by Area of residence.



Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

c) Appliance and assets ownership

At the district level, 79.6% of private households possess at least radio, 6.0% own at least one television and 1.7% own at least a computer. 59.0% of population aged 10 and above own a mobile phone while 8.1% own a smart phone. Across sector, the percentages of population aged 10 and above owning a mobile phone are high in Byumba and Cyumba sectors (70.9% and 70.1%, respectively) while such percentage is low in Giti sector (47.6%). Ownership of smart phone is high in Byumba (22.7%) and Kageyo (11.1%), and low in Bwisige and Nyamiyaga sectors (4.1%, each). Radio ownership within households is high in Byumba and Cyumba sectors (85.8% and 85.9%, respectively) and low in Gisti sector (71.4%). The percentage of households owning at least a computer is high in Byumba sector (7.0%) and low in Bwisige sector (0.5%).

Table 24: Percentage of private households and of Gicumbi District possessing electrical appliance

Sectors and area of residence	Total Number of Private Households	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone2	Smart Mobile	Computer
Rwanda	**3,312,743**	**81.5**	**12.3**	**78.1**	**20.8**	**4.2**
Northern Province	**506,064**	**82.1**	**7.5**	**77.6**	**15.3**	**2.3**
Gicumbi District	**109,373**	**79.6**	**6.0**	**74.5**	**12.7**	**1.7**
Bukure	4,774	77.8	5.0	73.3	11.4	1.0
Bwisige	4,328	75.8	2.9	68.7	7.1	0.5
Byumba	10,762	85.8	17.6	82.8	29.8	7.0
Cyumba	4,203	85.9	7.6	82.5	15.6	1.3
Giti	4,164	71.4	3.4	65.6	8.0	0.9
Kageyo	4,994	77.4	7.3	73.6	15.8	2.4
Kaniga	4,003	83.3	6.5	79.6	15.0	1.5
Manyagiro	5,479	78.4	4.0	72.8	8.4	0.7
Miyove	5,138	77.7	4.7	72.2	9.2	0.9
Mukarange	4,431	83.6	4.0	78.7	11.1	0.8
Muko	5,054	77.9	3.3	72.6	8.8	0.8
Mutete	6,990	81.7	6.0	76.9	14.1	1.8
Nyamiyaga	5,056	76.3	3.0	68.1	7.8	0.7
Nyankenke	5,846	82.0	2.5	75.8	8.3	0.6
Rubaya	2,954	80.6	4.6	76.4	11.2	0.6
Rukomo	6,921	75.2	4.8	70.1	11.1	1.3
Rushaki	3,644	82.5	4.7	77.3	12.3	0.9
Rutare	6,904	78.9	6.1	73.8	12.2	1.4
Ruvune	5,583	75.6	3.1	68.9	8.4	0.9
Rwamiko	3,623	78.9	5.9	71.5	12.2	1.4
Shangasha	4,522	80.5	4.3	76.1	9.5	0.7

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

d) Access to energy for lighting and cooking

In Gicumbi district, the main source of energy for lighting used by households is electricity (49.1%), followed by flashlight/phone flashlight representing 41.3%. At the sector level, the percentage of households using electricity as the main source for lighting is high in Byumba (64.3) Kaniga (63.5%) and low in Rukomo (40.6%) and Miyove (40.9%). The percentage of households using flashlight/phone flashlight is high in Miyove (54.4%) and low in Byumba (24.1). The sources of energy for lighting in Gicumbi district are mainly electricity, flashlight/phone flashlight and candles. However, the percentages of households using them vary by area of residence. In both urban and rural areas, the most frequently used source of energy for lighting are electricity and flashlights, but with disproportionate shares. In urban areas, the percentage of households using electricity as the main source of lighting is 70.9% while households that use flashlights as the main source of lighting represent 19.6%. In rural areas, in main source of energy for lighting is electricity (93.2%), followed by candles (3.6%) and flashlight/phone flashlight (2.6%). In rural areas, 54.5% of private households use electricity as main source of energy for lighting while 31.8% use flashlight and 9.4% use candles.

Table 25: Distribution (count and %) of households of Gicumbi District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin lamp	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for Lighting	Not stated
Rwanda	**3,312,743**	**100**	**61.0**	**0.4**	**0.0**	**2.9**	**4.2**	**1.1**	**28.4**	**0.1**	**1.2**	**0.5**	**0.0**
Northern Province	**506,064**	**100**	**54.1**	**0.3**	**0.0**	**3.0**	**5.0**	**0.8**	**35.3**	**0.1**	**0.9**	**0.4**	**0.0**
Gicumbi District	**109,373**	**100**	**49.1**	**0.2**	**0.0**	**2.9**	**3.7**	**1.4**	**41.3**	**0.1**	**0.7**	**0.5**	**0.0**
Gicumbi-Urban	6,903	100	70.9	0.2	0.0	6.0	1.6	0.1	19.6	0.1	1.2	0.2	0.0
Gicumbi-Rural	102,470	100	47.6	0.2	0.0	2.7	3.8	1.5	42.8	0.1	0.7	0.6	0.0
Bukure	4,774	100	52.9	0.2	0.0	3.0	0.7	2.8	39.3	0.2	0.4	0.4	0.0
Bwisige	4,328	100	42.8	0.2	0.0	1.5	5.6	1.1	47.9	0.1	0.4	0.4	0.0
Byumba	10,762	100	64.3	0.3	0.0	5.6	4.2	0.2	24.1	0.1	0.9	0.3	0.0
Cyumba	4,203	100	54.0	0.1	0.0	2.9	4.8	0.4	36.8	0.0	0.5	0.4	0.0
Giti	4,164	100	46.1	0.1	0.0	1.5	1.3	3.5	44.7	0.1	2.3	0.4	0.0
Kageyo	4,994	100	42.8	0.2	0.0	5.7	5.4	1.3	42.6	0.2	1.2	0.5	0.0
Kaniga	4,003	100	63.5	0.0	0.0	2.2	6.8	0.6	25.4	0.3	0.6	0.5	0.0
Manyagiro	5,479	100	43.6	0.1	0.0	2.8	5.3	2.5	44.5	0.1	0.5	0.6	0.0
Miyove	5,138	100	40.9	0.0	0.0	0.9	2.0	1.2	54.4	0.1	0.2	0.4	0.0
Mukarange	4,431	100	46.6	0.1	0.0	1.8	4.4	1.3	44.5	0.3	0.7	0.4	0.0
Muko	5,054	100	47.3	0.3	0.0	1.1	1.0	1.6	47.8	0.1	0.3	0.4	0.0
Mutete	6,990	100	51.1	0.4	0.0	3.7	2.7	0.5	40.4	0.2	0.6	0.4	0.0
Nyamiyaga	5,056	100	48.2	0.1	0.0	2.2	1.6	1.5	45.3	0.1	0.4	0.5	0.0
Nyankenke	5,846	100	49.6	0.2	0.0	2.0	3.2	2.6	40.9	0.1	0.7	0.8	0.0
Rubaya	2,954	100	50.3	0.3	0.0	1.4	10.7	0.9	33.4	0.1	0.7	2.1	0.0
Rukomo	6,921	100	40.6	0.1	0.0	4.3	5.6	1.3	46.5	0.1	1.0	0.4	0.0
Rushaki	3,644	100	52.6	0.3	0.0	1.5	2.1	0.9	41.9	0.1	0.3	0.4	0.0
Rutare	6,904	100	44.5	0.3	0.0	2.5	1.3	1.8	48.2	0.1	0.7	0.7	0.0
Ruvune	5,583	100	43.1	0.2	0.0	2.6	3.5	1.7	46.9	0.1	0.5	1.4	0.0
Rwamiko	3,623	100	54.2	0.2	0.0	1.5	0.5	1.5	41.5	0.1	0.4	0.2	0.0
Shangasha	4,522	100	44.4	1.0	0.0	4.0	7.6	1.3	40.1	0.1	1.0	0.5	0.0

Source: Fifth Rwanda Population and Housing Census,2022(NISR)

At the district level, the main sources of energy for cooking used by the private households is firewood representing 93.5% followed by charcoal (4.3%). Firewood is the main source of energy across all sectors of Gicumbi district where the lowest percentage of households using them as the mains source of cooking energy is observed in Byumba (77.4%) and Mutete (89.9). charcoals are mostly used in Byumba sector (16.8). the shares of other sources of energy for cooking is relatively small. The main sources of energy for cooking used by private households in Gicumbi district vary by area of residence. In Rural areas, private households use mostly firewood (95.3%). In urban areas, private households use mostly firewood (63.2%) and charcoal (28.2%).

5 PUBLIC CONSULTATION AND PARTICIPATION

5.1 Overview

Public and stakeholders' consultation and involvement are principal for the successful implementation and management of a project's environmental and social impacts. The stakeholder engagement is conducted with the objective to build a trusting relationship with the affected communities and other interested stakeholders based on a transparent and timely supply of information and open dialogue. The consultation helps also to actively build and maintain productive working relationships, based on principles of transparency, accountability, accuracy, trust, respect and mutual interests with affected communities. In our case consultations were held at the project sites in all districts covering the project area. The purposes of conducting the consultation were:

- To inform local community about the project implementation and prepare them on potential impacts that could be caused by the project and that can affect them;
- To identified alternatives related to the project implementation and build a trusting relationship with the project activities and affected personnel;
- To ensure effective engagement with local communities and key stakeholders throughout all phases of the project;
- To collect relevant and trustable information that shall be based on to formulate project impacts and their mitigation measures;
- To actively build and maintain productive working relationships, based on principles of transparency, accountability, accuracy, trust, respect and mutual interests with affected communities and other stakeholders.

5.2 . Public participation – methods and process

Consultative meetings were held in different localities of the project areas of intervention and grouped local population susceptible to benefit or be affected by project implementation. Selection of the areas for interviews were based on the sites to be connected to the electricity and one to one or group interviews with local residents were used. Consultations with REG staff at branches (located in each district) and other authorities at district level were also consulted. In the entire province a total number of 156 people were contacted and among them 105 being male (67%) and 51 being female (33%). the lists of consulted people are presented in Annexes of this report. Local communities of the project sites who will be positively or negatively were provided with relevant and sufficient information on the project prior to its start – up. The figure below illustrates some of the consultation held on site during the conduct of the study.

Figure 9: Consultations with local community

Source: Field Consultation

5.3. Outcome of consultation

Based on the project extent, consultations were held at different centers making the area of project intervention and the key findings of the consultations are summarized in the table below:

Table 26: Summary of discussions with stakeholders

Discussions/ information	Outcomes
Is the project going to cause physical resettlement	No physical resettlement is expected to be caused by the project. The project aims to connected households to electricity and was designed to pass along the buffer zones of the existing roads located in the project areas. However, some of the properties especially trees and crops may be affected. In that case fair compensation will be provided as the law related to expropriation in public interests.
We are noting that the project is very important to us. When can we expect the project t start	The project is expected to start as soon as all approvals are in place including this ESIA study. It is planned that the project starts by mid-June of this year.
Are locals allowed to continue cultivating their land?	People are allowed to continue using their land till they are informed by competent authorities about any new changes. Before construction of new houses in the grouped settlement construction permit must be requested from competent authority
is there any jo opportunity that we aca expect from project implementation?	A number of temporally jobs will be available especially during construction period. Contractor will ensure that locals are prioritized when allocating jobs that don't require specific knowledge. Hover this is not guaranteeing that all local population will be employed by the project during construction works.
Will the project destroy houses?	The project designs were made to pass all along the buffer zones of existing feeder roads of the project areas. Where not possible the MV lines will be passing in agricultural lands and the best options to avoid damage and selecting the shortcut will be applied. no houses are expected to be destroyed due to the project activities. In any case this happens, fair compensation will be made accordingly.
Soil erosion and sedimentation.	In some areas of the project soil erosion may occur and is anticipated especially during rainy season. Maximum effort will be made to avoid soil erosion especially through the application of the developed mitigation measures to avoid soil erosion and degradation.
Soil waste generated from the projec	The excavation works will generate waste as construction debris. The soil excavated will be re-used for backfilling the excavated holes. EDCL is experienced in construction of such project. Maximum effort will be made to minimize waste during project implementation
who is eligible to be connected?	Anyone wishing to be connected will have opportunity to have electricity. However, those living in remote areas could not be connected due to some constraints that shall be discussed during project implementation as by regulation only houses within 37m from wooden pole are connected.

Discussions/ information	Outcomes
Source of construction materials	Project don't require a lot of construction materials. However, those required will be outsourced within the project areas and from certified and approved quarries.
Will be there any changes related to land use or/ and prohibitions due to the project?	It is not planned that the project will change the land use of the project areas. However, some crops will not be allowed within the ROW of the electrical line. These are crops of more than 5m of height as per the RURA' s regulation related to the use of right of way.
Will be there any land compensation?	The project will pass nearby the existing roads. For the upgrading the existing routes will be used. hence no compensation for land is expected. However affected crops will be compensated. An agreement of land lease between EDCL and landowners shall be completed before project starts and a fair compensation of crops and other affected assets will be done.
Discussion on project impacts (both positive and negative) and mitigation measures.	Project impacts were discussed and are detailed in this report and mitigation measures for negative impacts were discussed. It was noted that positive impacts prime on negative impacts and locals wished the project to speed up and be implemented at least before end of the 2023-2024fiscal year.

To conclude, most of the people in living in the project areas are verry happy to hear about the upcoming project as this will contribute to the development of their living standards. Most of houses of the project area are not connected to the national grid and have been living around neighbours who are connected for long (these are located in neighbouring villages). The positive impacts of the project outweigh the negative impacts and locals wished the project to be implemented as soon as possible while appreciating it.

6. PROJECT ALTERNATIVES ANALYSIS

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.

6.1. 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 provided on the maps in annexes of this report. The proposed line routes and ROWs were selected among the various options, based on the softness 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 avoiding passing over houses which shall incumber houses demolition and hence physical displacement,
- the minimization of the destruction of property,
- easy accesses to construction and operation sites,
- low pollution level by avoiding water sources and marshland's locations
- closer to the settlements to be supplied.

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

Table 27: Description of identified alternatives.

No	Alternative considered	Description
1	Preferred Option: Overhead Power Lines	This alternative is as proposed by EDCL, detailed in the preliminary route designs received for the project, involving overhead power lines.
2	No-Go Option	This alternative means that no distribution lines are constructed, and the situation remains as it is.
3	Underground Power Lines	This alternative involves the construction and laying down of distribution lines in the ground.
4	Alternative land use	This alternative involves the use of land designated for agriculture to reduce the use of land for residential purpose, this will allow the landowner where the electrical work will pass to avoid disturbance of the construction and residential activities. The project will use the land dedicated to the agriculture.
5	Construction Methods	This alternative involves the implementation of alternative construction methods, as compared to those proposed in alternative 1 or the preferred option.

6.2. 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 28: Analysis of alternatives

No	Alternative	Analysis
1	**Preferred Option: Overhead Power Lines**	EDCL 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. It is proposed that the specific routes to be used are mostly in the roads reserve, thus significantly reducing the impacts, as well as those resulting from maintaining the RoW when deemed necessary.
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 entails missing all the positive impacts or benefits anticipated from the project such as increased access to reliable and safe electricity network without interruption, temporary and permanent employment opportunity from project implementation etc.
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 are not an option

No	Alternative	Analysis
		for present project. Moreover, the proposed length of the project 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.
4	**Alternative land use**	This alternative involves the use of land designated for agriculture to reduce the use of land for residential purpose, this will allow the landowner where the electrical work will pass to avoid disturbance of the construction and residential activities. The project will use the land dedicated to the agriculture.
5	**Construction Methods and Techniques**	The construction methods and techniques proposed in Alternative 1 involve hand work and have insignificant direct impacts that include but not limited to job opportunities, the use of roads buffers to limit vegetation clearance, income generation, consideration of the overhead line, the use of updated technology etc. The consideration of this separate option is thus unnecessary, as it already falls into the preferred option described above.

Therefore, based on the proposed project nature, extend and location and based on the social and environmental assessment of the project site, the consultant is concluding that the most preferred alternative would be implementing the project with the implementation of mitigation measures of the anticipated negative issues as detailed in this report.

The project has identified more positive than negative environmental and social impacts. The identified potential impacts to both social and environment have been found to be at an extent that can be avoided, minimized, or compensated when applying the proposed mitigation measures in the Environmental Management Plan and monitoring plan as developed in this report.

7. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

Electrification project is crucial to the economy, health, and welfare of the local community and the country in general. This chapter describes the impacts identified for the implementation of project and the identified impacts apply to the socio-economic environment as well as the bio-physical environment. The impacts identified are both positive and negative, direct, or indirect, long term or short term and may be local or extensive.

7.1. Positive impacts

The project will be implemented in majority in in rural centres and even in some smaller villages near to the roads where 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. Potential beneficiary enterprises affected by and contributing to regional socio-economic transformation will be small industries such as sawmills, 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.

It is expected that the proposed project will create numerous direct jobs, many of which will be sourced from the project areas. 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 guard, bush clearing, holes digging, cable stringing etc.

a) Employment

The present project will involve different works including soil excavation, poles election, cable stringing, ROW clearance etc. These works requires both skilled and unskilled workers. Based on the project size and similar project, more than 150 both unskilled skilled workers in each district will participate in works during construction and operational phase. The priority should be given to local people especially unskilled workers to provide them with more income, capacity building and increase ownership.

Enhancement measures:

Give preference to local people for casual labourers when allocating temporally jobs. Officials from cells and villages of the electrification coverages may be involved in recruitment processes as they are aware of the behaviours and the conduct of those to be recruited.

b) Increased number of households' connectivity

The project aims to increase the number of households connected to electricity. However, the number of households to be connected is not exhaustive as new connections will be done from new houses being constructed in the project areas. Hence the implementation of the project will lead to the increased number of households connected to the electricity and hence contributing to the achievement of the fixed country's target to get 100%. access to electricity to all resident by 2024.

Enhancement measures:

Registration of nearby people in the project area without electricity connection to be sure no one is left behind.

c) Increased public revenues and income

Revenues shall be collected by both the national and local authorities from the procurement of project construction materials and equipment, new business opportunities emanating from project implementation, employees' salaries, VAT on materials and services, among others.

Enhancement measures:

Give preference to local people for connectivity especially those owning businesses that generate income to the public revenues. These include commercial centres as well as those involved in trading activities.

d) Improved business opportunities within the project areas

The development of electrification project is meant to bring business opportunities in the project areas such as welding, workshops, hair salon etc. This may create and attract more businessmen to the project areas and hence increase business and infrastructure development in project areas.

Enhancement measures:
Increase the stakeholder engagement and community participation to ensure their needs are addressed during project implementation.

e) Affordability of education and increased access to medical Insurance and other benefits
Increased incomes from employment opportunities at the project works will hand the locals of the area employed by the project the ability to pay school fees and increase their access to medical insurance "Mituelle de santé".

Enhancement measures:
Increase the stakeholder engagement and community participation to ensure their needs are addressed during project implementation.

f) Overall long-term increased access to electricity
The long-term direct positive impact is an access to reliable electricity supplies, which will lead to better provision and easier management of goods and services and enable new facilities for processing and storage. There will be better availability and use of computers and communication facilities like internet in rural areas, as also charging for mobile phones; also, electric lighting adds to security at night and enables extended opportunities for work and study.

Enhancement measures:
During procurement of materials ensure they are procured the long-lasting construction materials which will serve the population in long term as per the project design.

g) Improved quality of life
Electricity project would support overall education in the project areas and strengthen the ongoing effort of capacity building to overcome critical constraints in the education sector. Essential to this effort would be power supply to health centres and consequently, the quality of life and extent of economic opportunity will be changed for the better.

Enhancement measures:
Increase the stakeholder engagement and community participation to ensure their needs are addressed during project implementation.

h) Provision of alternative sources of energy
As noted during the field surveys, in different areas not connected to national grid, local people are using woodfire and crop residue as main source of energy for lighting and cooking. Increased transmission and distribution of electricity to the project area will reduce the pressure on the use of fuel wood and in effect would help to conserve the fragile and diminishing forest cover of the country by providing an alternative source of energy in the area.

Enhancement measures:
Increase the stakeholder engagement and community participation to ensure their needs are addressed during project implementation.

7.2. Anticipated project negative impacts during planning and construction.
The predicted negative impacts for the implementation of the present project were assessed by considering different planned activities and are presented in three main project phases: design and planning phase, construction phase and operation phase. For each negative impact identified, mitigation measures were proposed as described in the next paragraphs of this chapter. The adverse impact will occur later mainly during and after construction and operation phase. For instance, there will be a few activities that include but not limited to excavations, soil disturbance, increased traffic around project sites due to delivery of project construction materials etc. All these are likely to pollute and degrade the local environment, through mudslides, noise, and dust and air pollution. Potential adverse impacts emanating from the project activities are described in detail here below together with the recommended mitigation measure to avoid or minimize their impacts.

7.2.1 Negative socio impacts and their mitigation measures

A) Labor influx
Project activities may attract many people in the project areas in search for employment and settlements. The presence of these workers in the community may cause conflicts between workers and community residents. Such

behaviour are generally related to socially unacceptable behaviour according to local social standards and can be seen, for example, cases of drunkenness, robbery, insecurity, Sexual exploitation, and Gender based violence and pressure on existing social infrastructure.

Mitigation measures

- Maximum effort will be made to recruit locals who return to their home after work;
- The contractor will be required to prepared and implement a code of conduct and each employee will sign it;
- Project level Grievance redress mechanism and GRCs will be stablished and include local community and local leaders' representation, to settle any issues that may arise.
- Development and implementation of a Labor Management Plan
- Undertake training and awareness sessions for workers on SH, SEA, HIV/AIDS, STDs and communicable diseases.

B) Loss of crops and other assets such as trees

During line route survey and electrical lines construction, there will be environmental degradation especially destruction of natural vegetation, food, and cash crops. There are no identified sensitive or protected ecosystems that shall be affected by the project activities such as wetlands.

Mitigation measures

- Local community and project beneficiaries will be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable;
- Priority in job allocation will be given to the affected local people as an alternative income source to sustain their domestic requirements.
- Project activities will be implemented after harvest to avoid crops losses and damages;
- Survey activities will avoid at the maximum the zones of environmental risks such as marchland and protected areas;
- Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations.
- Remove as much vegetation as possible by handheld tools and avoid the use of heavy machinery, especially in sensitive areas.
- All workers to be sensitized against unnecessary destruction trampling and clearance of flora,
- Where losses of vegetation/crops are inevitable, compensation measures be instituted as per the BVR prepared. Ensure the RoW is restricted as much as possible to the road reserve and other public spaces.
- Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations
- Remove as much vegetation as possible by hand held tools and avoid the use of heavy machinery, especially in sensitive areas.
- All workers to be sensitized against unnecessary destruction trampling and clearance of flora,
- Tree species listed in the IUCN Red list and seen during the surveys will be marked and avoided, wherever possible, by re-aligning the route;
- Where losses of vegetation/crops are inevitable, compensation measures be instituted as per the RAP prepared.

C) Injuries or fatalities from improper manual handling

The most common injuries or illnesses connect to similar projects because of manual handling are musculoskeletal disorders in various parts of the body (back, neck, shoulders, or other) and include from sprains and strains to damage to muscles, joints, and vessels. Other injuries include cuts, bruises, lacerations, and fractures due to unexpected events such as accidents caused by manual handling.

Mitigation measures

- All project workers will be provided with health insurance as means of health affordability;
- Appropriate measures will be taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works;
- First aid kit will be provided and avail permanent at the work site;
- Provision of appropriate Personnel Protective Equipment (PPE) to all employees;
- Sign boards at the project site will be provided to prevent accidents and troubles involving site workers.
- The contractor will establish health and safety measures that must be implemented at the project site by all workers;
- The entire project will be insured;

- The safety plan and measure will be prepared and enforced at the project site;
- Working conditions will respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda;

D) Possible increases of HIV/AIDS and other communicable diseases

Risk of increase of HIV/AIDS and other Sexually Transmitted Diseases (STD) due to the increase of people from outside of the project zone may arise among workers. Though there is no workers camp site planned for this project communicable diseases may be anticipated among workers

Mitigation measures

- All project workers will be regular sensitized on ways of HIV/AIDS contamination and prevention and other communicable diseases;
- Toolboxes talks will be conducted on the ways of diseases contamination and prevention.
- Contractor to have in place an HIV/AIDS Prevention and Management Policy.
- Sensitize community and schools about construction hazards as well as HIV/AIDS.
- Provide workers with condoms. Free of charge as means of HIV prevention
- Communities will be encouraged to report cases of illicit sexual behaviour by contractor workers to REG and local authorities.
- All workers to have access to medical care

E) Occupational, health and safety issues

During construction activities, workers will be subjected to situations that could be detrimental to their health and safety such as injuries caused by handling of construction equipment, election of poles, injuries from stepping on or using sharp objects, fires, accidents, communicable disease hazards due to interactions among the workers or with service providers such as food vendors, emissions of dust from clearing and excavation works and fumes from vehicles and other noise and vibrations from project equipment etc.

Mitigation measures

- A qualified EHS officer will be available to monitor the overall compliance of the Environmental health and safety compliance;
- All site workers will have medical insurance “mituelle de sante” a means of affordability of treatment;
- All site workers will sign a code of conduct as means of good conduct during project implementation;
- First aid Kits and first aid helper shall be provided at working area and medical agreement will be established with the nearest health Center in case of emergence or serious injuries;
- The site shall be insured for any incident that may occur during project works.
- Toolbox talks on OHS, emergency response plans, labour management, traffic management, first aid training and response, etc. should be included in contractor obligations;
- Workers on the site will be provided with appropriate personal protective equipment (PPEs) such as; safety boots, helmets, reflective jackets, and overalls;

F) Child labor, forced labour and discrimination.

The present project is planned to be done in compliance with national and international standards in terms of child labor forced labor and discrimination. Therefore, recruitment procedures and minimum working age should be included in Contractor’s Environmental and Social Management Plan.

Mitigation measures

- Avoid any form of discrimination or exclusion during project activities;
- Mitigation measures against child labor, forced labor, discrimination and abusive dismissal should be clearly included in contractor labor management Plan;
- Protect workers’ rights by providing work contract to every project employee;
- Recruitment of project workers shall be done based on the working age.

G) Vandalism of the project infrastructure

With the coming of the project, a few infrastructures will be made from metal, steel and concrete. Some people may be involved in vandalism of such equipment’s.

Mitigation measures

- Sensitization of local communities on the project ownership and protection;
- Use community policing as a means of ascertaining security to avoid vandalism;
- Regulations on penalties to perpetrators convicted of vandalism are necessary;
- Punitive actions towards perpetrators by the authorities will facilitate compliance by the locals thereby avoiding vandalism.

H) Health issues

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

I) Safety issues

Accidents including cuts, pricks and bruises; electrocution from naked electrical cables; falling in uncovered manholes and trenches, from raised places and on slippery could occur. Accidents could result from lack of supervision and job training, improper handling of machinery and hand tools and inappropriate carrying out of tasks.

Mitigation measures

Additional mitigation measures to the above detailed are:

- Avoid excavation works in areas with loose materials in extremely dry weathers to prevent dust;
- Reduce cases of trespass and theft; and control entry and exist in working areas to avoid conflicts between people at the site and the people in the neighbourhood;
- Have a fully always equipped First Aid Kit at the site and ensure that trained first aid personnel are available to handle any incidents that may occur;
- Provide workers with appropriate PPE including boots and overalls etc. The PPE must be worn in all situations where the body and skin are potentially exposed to hazards such as harmful dusts, infectious wastes, sharp objects etc.
- Ensure adequate clean water supply that keeps to the minimum chances of disease outbreaks;
- Provide hazard notifications, signage and warnings to warn visitors and staff of potential dangers that may exist in different areas of the project sites;
- Clearly display emergency contacts such as ambulance and police at the construction site;
- Warning signs will be expected to be displayed next to dangerous points and machines to restrict the movement of unauthorized personnel on site during construction and to warn heavy load vehicles that will be at the site against possible danger;
- All litter and debris will be picked up and disposed in a designated disposal site to avoid subsequent injuries during and after the construction work is complete;
- A safety officer will be at the construction site during the construction phase, always to make sure a first aid kit is always available and that the skilled workers are aware of the safety rules.

7.2.2 Negative physical impacts and their mitigation measures

a)Increased traffic in the project area

The electrification project will be implemented in remote and rural areas where traffic is not intensive. In different areas only observed traffics are those temporarily from outside the project area transporting harvest, personnel, and other materials. However, during project implementation period, they will be increased of traffic due to moving vehicles transporting project materials and personnel. Therefore, young people may strike or run over by moving vehicles causing minor to major injuries (fractures, wounds) or death, falling from vehicles, causing injuries or death or vehicles may hit people especially children playing in roads.

Mitigation measures

- All project drivers will be provided with safety trainings;
- Local traffic police will be involved for traffic monitoring;
- Where possible speed limit and other traffic signs will be installed especially in project working areas.

b) Soil and water pollution

Sources of potential soil and water pollution may include the following:

- Improper waste disposal of construction materials.
- Maintenance and servicing activities of the transformers

Mitigation measures

- The defected transformers will be well disposed of and transported to the recycling area.
- The oils change of transformers will be done by competent and trained personnel.
- Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas.
- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses;
- The contractor to ensure disturbed sites, particularly the pole sites are restored immediately after works, and sediment control measures are in place for sites prone to soil erosion;
- At the staging areas clearance of vegetation will be limited to only those areas where it is absolutely necessary;
- If the storage of hazardous chemicals (i.e. fuels, lubricants) onsite cannot be avoided, these will be stored on raised locations such as paved ground surfaces to prevent leakage into the ground. The storage areas and the containers will be inspected daily and any spills immediately cleaned; Contractors however should consider use of mobile fuelling tankers other than fuel storage on sites
- All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line
- All vehicles and equipment to be serviced in designated areas, preferably at garages in urban centres along the lines

c)Soil erosion

During the construction works which will also involve clearing of vegetation, excavation works for holes of poles etc. such activities may result in the increased erosion in areas where vegetation has been removed. This could lead to increased sediments deposition in the project areas.

Mitigation measures

- During project works, contractor will only clear areas earmarked for construction;
- Efforts should be made to contain earth movement activities to dry seasons to avoid erosion.
- The excavated soil shall be re-used in backfilling.

d) Air and Noise Pollution

Through site clearing and excavation at some areas dust generation is expected. Noise associated with construction can disturb households and neighbouring communities of the ROW as well as the local wildlife.

Mitigation measures

- All kind of burning of any kind of waste shall be prohibited at project site and its vicinities.
- Excavated soil shall be re- used in backfilling the excavated holes;
- The excavated holes should be clearly marked;
- Workers will be provided with personal protective equipment;
- Works should be executed in short period of time to minimize the dust generation at the site;
- The movement of heavy vehicles during the night will be avoided;
- If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and shop owners) will be informed of the timing and duration of the nuisance.
- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses.
- The contractor to ensure disturbed sites, particularly the pole sites are restored immediately after works, and sediment control measures are in place for sites prone to soil erosion.
- At the staging areas clearance of vegetation will be limited to only those areas where it is absolutely necessary.
- If the storage of hazardous chemicals (i.e. fuels, lubricants) onsite cannot be avoided, these will be stored on raised locations such as paved ground surfaces to prevent leakage into the ground. The storage areas and the containers will be inspected daily and any spills immediately cleaned; Contractors however should consider use of mobile fuelling tankers other than fuel storage on sites
- All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line.

- All vehicles and equipment to be serviced in designated areas, preferably at garages in urban centres along the lines

e)Oil spillage.

The expected liquid waste might result from leakages of oil from the transformers during its normal operation or defects. However, this is impacts temporally and limited depending on the quality and standards of the transformers to be supplied during the project execution.

Mitigation measures

- Careful handling of oils and other liquids will be done to prevent oils spillage during refilling;
- Proper maintenance of machinery and equipment is required to avoid leakages;
- Transformers to be supplied must comply with the approved standard;
- The refiling and maintenance should be done with qualified and experienced personnel;

f) Landscape and Visual impacts

The visual impact of the power line is an effect on a socio-cultural level. From the perspective of rural populations, this is seen as a sign of development, of hope that things will change for the better. It is important to note that the proposed development will also have minimal effects on the landscape as the proposed routes for the powerlines were established based on the existing roads so as to meet housing requirement imposed by the natural landscape, objects, buildings, and facilities in the neighbourhood, while incorporating it into the existing landscape of the project areas.

g) Impacts on water resources

No water will be used for technological purposes. However, the overhead transmission lines will cross some water courses. The poles will be placed to leave a protection zone of 15m when crossing the streams with the span ranging of 10-15 m, and 5 m when crossing any drainagechannels.

h) Electric and magnetic field

Electric overhead lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived health effect. The strength of both electric and magnetic fields is a function of the voltage, distance from the conductors to the ground and the lateral distance from the line to the receptor. Many studies published on occupational exposure to Electro-Magnetic Fields (EMF) have exhibited a few inconsistencies and no clear, convincing evidence exists to show that residential exposures to electric and magnetic fields are a threat to human health. However, the EMF decrease very rapidly with distance from source and there should be no potential health risks for people living outside the provided meters under the RURA guidelines on right of way.

7.2.3 Negative Biological impacts and their mitigation measures

a) Loss of flora and fauna

It is well known that transmission lines induce physical hazard to birds and climbing animals. This is likely to be of concern during the operation phase of the project. The impact of a transmission line on fauna is limited taking into consideration that most of the lines will be constructed along the existing roads. Except for birds, most animals are not disturbed by the transmission line.

Mitigation measures

- The sites clearance should be only done on an area demarcated for project activities;
- This impact is unavoidable and will be mitigated through compensation measures which include fair compensation of affected crops and trees;
- To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation.
- Pits for poles should be covered everyday
- Ensure that the habitats are not disturbed by limiting the RoW within the road reserve;
- Limit clearance for installation work and inspection to the necessary extent.
- Given the slow nature of amphibians and mammals, they should be scared away and allowed to escape prior to works once sited
- Any amphibian and reptiles encountered during the construction phase that cannot flee on its own accord should be relocated. The herptiles should be relocated to a suitable area immediately outside the

construction footprint area but under no circumstance to an area further away
- Construction workers to be sensitized no to cause harm to wildlife
- Ensure that the habitats are not disturbed by limiting the RoW within the road reserve.
- Limit clearance for installation work and inspection to the necessary extent.
- Ensure that the habitats are not disturbed by limiting the RoW within the road reserve.

b) Impact related to regular vegetation clearing within the RoW

In the ROW of the line, vegetation should always be cleared and removed to avoid affecting operation of equipment and that will be done regularly by clearing. Natural vegetation along the line, will be cleared. different trees species will be eliminated in the ROW, which has an impact on the population's lifestyle and biodiversity in those areas. Vegetation clearing could disturb fauna species on the areas of intervention.

Mitigation measures
- Clearing of RoW should be done by experienced personnel and appropriate monitoring be conducted;
- Only clear areas reserved for the RoW.

c) Risk of bird collision

Once established, the transmission lines may cause increased risk of collision of birds in flight, however this risk is expected to be minimal as the lines don't pass through any documented important bird areas.
- Conductors along wetlands and in birds migration areas will run horizontal not vertical.
- Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters

d) Disturbance of ecosystems habitats

The clearing of existing vegetation will result in the complete loss of associated ecological habitats and their fauna, within the project sites. Noise, vibrations, and intrusive activities related to construction works will tend to scare away living biota remaining on the site after vegetation clearance.

7.2.4 Negative impacts of the decommissioning works

The lifespan of the proposed transmission lines is expected to be long. At the end of its lifespan, decommissioning of the project would occur. This is because, as with any project, the facilities, such as poles and cables used in this project will have a lifetime after which they may no longer be cost effective to continue operation. During decommissioning, all transmission line structures, and equipment would be dismantled and removed. The physical removal of the line and poles will be the reversal of the construction process. All areas disturbed by the proposed project would be restored to pre-project conditions and/or to conditions acceptable for environmental protection. Potential environmental impacts caused during decommissioning which will be mitigated as per the provided environmental management and social plan are dust and noise to the surrounding environment and public safety.

Mitigation measures
- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works.
- Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center.
- Measures to minimize effects on surface water, groundwater, and other resources during decommissioning phase, and identify how project materials would be recycled.
- Most of the decommissioned materials shall be recyclable such as steel structures and cabling. The recycling or reuse of materials, such as scrap metal, would depend on the market and existing technology.
- Provide protective equipment to site workers as means of impact prevention.
- Specific actions shall be identified and scheduled to restore the project areas to acceptable conditions.
- The wooden poles shall be used as source of energy for cooking by local people.

7.3. Adverse impacts during operation phase

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

7.3.1 Negative Socio impacts during the operation phase

a) Public hazards

Placement of low-slung lines or lines near human activity (e.g. highways, buildings) increases the risk for electrocutions. Also, poles and transmission lines can disrupt airplane flight paths and endanger low-flying aircraft.

Mitigation Measures

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

b) Fire risk

The risk of fire outbreaks during bad weather e.g. storms, winds etc cannot be overruled especially if electrical faults occur in the "mini" substations. Also, failure to maintain the ROW could cause the overgrowth of nearby trees that could end up crashing on the lines during poor weather and hence cause fire outbreaks of black outs.

Mitigation measures

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

c) Bird Strikes/Collusions

Transmission and distribution networks are known to be a potential source of bird strikes that get entangled to the lines causing their injury or even instant death. This is especially significant when large flock of birds migrates from one point to another and usually gets struck by these transmission or distribution lines.

Mitigation Measure

- Once established, the transmission line may cause increased risk of collision of birds in flight, however this risk is expected to be minimal since the route does not pass through any known migratory bird routes.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS

8.1. Environmental and Social Management Plan

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). The provisions of the ESMP must be implemented in final design stages, as well as the construction and operational period of the project. 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 the provided ESMP is covering the entire project in northern province and considering that it will be implemented in the form of EPC Contract (Engineering, Procurement, and Construction) in each district whereby a contractual agreement between REG and wining contractor will be made in a form of contractual framework, this will enable the owner to transfer the complete risk of design, procurement, and construction to the contractor. The contractor will be solely responsible for implementing the project and handing it over to the REG in a turnkey condition and covering all project sites in each district. 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. The ESMP for each district is provided in annexes of this report.

8.2. Environmental And Social Monitoring Plan

The monitoring plan summarizes the surveillance and monitoring activities proposed in the Environmental and Social Management Plan for this project. It also identifies the roles and responsibilities of stakeholders in the implementation as well as the estimated cost of the activities. The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that are effective. Environmental and social monitoring will enable response to the new and developing issues of concern. For this project, the Environmental monitoring will be carried out to ensure that all construction activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The contractors shall employ an environmental and social safeguard responsible for implementation of social/environmental requirements.

Environmental monitoring is also an essential component of project implementation. It facilitates and ensures the follow-up of the implementation of the proposed mitigation measures, as they are required. It helps to anticipate possible environmental hazards and/or detect unpredicted impacts over time. This environmental monitoring plan will operate through all phases of the project implementation namely the pre-construction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment.

The following aspects will be subject to monitoring:

- Encroachment of sensitive areas
- Vegetation maintenance around project work sites
- Works safety elements

Monitoring of the plan should be undertaken firstly by the contractors at work sites during construction, under the direction and guidance of the supervisor. The monitoring tools include but are not limited to:

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

Periodic ongoing monitoring will be required during the life of the project and the level can be determined once the project is operational.

It is the responsibility of the districts to conduct regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMP. The districts through EDCL and MINECOFIN will be responsible for compensation activities of affected assets and it will be responsible to undertake regular internal monitoring of the process.

The implementation of this monitoring plan should be based on direct or indirect indicators of emissions, effluents and resource use and the monitoring frequency should be sufficient enough to provide representative data for the parameter being monitored. The following are key parameters to be monitored during this project implementation:

1. Soil erosion monitoring

The excavation of earth for the establishment of poles, will be the responsibility of the Contractor to ensure the implementation and effectiveness of erosion control measures. Focus should be given to work sites where soil is disturbed and its immediate environ as well as along the ROW during and after vegetation clearing.

2. Monitoring of vegetation clearance

Unique stands of indigenous trees (if identified within the project areas) should not be removed for the establishment of poles. The Contractor's environmental inspectors should make sure that the unique tree stands if identified should not be removed. Where not possible, these should be relocated to another area referring to the chance findings procedures.

3. Monitoring of rehabilitation of work sites

The Contractor's environmental inspector should ensure that areas used as materials storage facilities are progressively rehabilitated after use. Once a site is rehabilitated it should be "signed off".

4. Monitoring of accidents and incidents

The contractor will make sure that appropriate signs are posted at appropriate locations/positions to minimize/eliminate risk of work incident and accident. In addition, the contractor should make sure that:

- Measures to create awareness regarding sexually transmitted diseases, primarily HIV AIDS, and other contaminating diseases are taken;
- Preventive measures to avoid work accidents are in place and followed appropriately
- All site workers are insured with mutuelle de sante as means of health affordability.

All districts of the project areas of intervention will have overall responsibility to oversee that all environmental measures are put in place and that regulations are enforced. The following parameters could be used as indicators:

- Presence of posted visible signs on poles
- Presence of sanitary facilities at project sites;
- Level of awareness of communities pertaining to dangers/risks associated with power lines;
- Presence of first aid kit at the project working sites and;
- Records on actual accidents associated with the establishment of thetransmission and distribution line

5. Monitoring of waste management

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

- All generated wastes are contained within construction sites and managed appropriately
- Solid waste: all site waste is to be collected and disposed of in an approved area or re-used. The segregation of waste (paper, glass, metal) shall be undertaken and recycling opportunities identified.
- Sewage at materials storage sites are disposed appropriately into sealed pit latrines or other approved sanitation systems.

Table 29: Environmental and Social Monitoring Plan to be implemented in each district of the province

Environmental items	Monitoring item	Parameter/Indicator	Location	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase						
Land acquisition and compensation	Fair compensation for affected crops, trees and other assets	Reports for affected crops, trees and other assets	Project area	Once before project activities	Districts/ local Authorities/ property valuer	To be determined under A-RAP for each district
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook	Project area	Regular	Districts local authorities/ PAPs	5,000 (for Estimated 50 complaints in each district)
Construction phase						
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	Project area	When deemed necessary	EDCL /Districts local traffic police	no cost required for recording
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	At construction and excavation sites	during project works	Contractor/ supervisor	300 for noise measurement in each district
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	Project site	As appropriate	Contractor/ traffic police	750 for automobile certification in each district
Soil erosion	Presence of soil erosion barriers at the project sites	Soil erosion and Turbidity in storm water	project areas	Daily	EDCL/ Districts	200 for each district
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	at project sites	regular	EDCL/ Districts	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	At the ROW	After project implementation	Locals /local authorities /EDCL/ Districts	cost for restauration to be included in project construction budget
Working conditions	Occupational health and Safety	Availability at site of OHS Plan	Project site	Permanent	EDCL/ Districts	Cost covered during the preparation of OHS plan

Environmental items	Monitoring item	Parameter/Indicator	Location	Frequency	Responsible	Budget (USD)
	Awareness on social, health and safety	Number of awareness conducted	Project sites	Daily	EDCL/ districts	5,000 for MoU signed between each district hospital
	Incidents and accidents at the project site	Presence of warning and reminding sign posts at the site	Project site	daily	Districts/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	project area	daily	EDCL/ Districts district / workers	40 USD to cater for overall PPE for each staff in each district
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	Project sites	regular	EDCL/ DISTRICTS District	300 to cater for sanitation facilities in each district
Child and forced labor	Minimum working age and working condition	Employment record by age	Construction areas	regular	EDCL /Local authorities/ project workers/ local population	No cost is required
Tree removal (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	At the project sites	Once	EDCL / Contractor/ Districts	to be covered under project construction budget
Operation phase						
Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Operation	Regular	EDCL/ Districts district/ local authorities/ local residents	To be included under line RED-EDCL operation and Maintenance budget
Degraded sites by the project activities	Rehabilitated areas after project activities	Areas rehabilitated after project works	Project sites	Once	Contractors/ EDCL	Under project construction budget

8.3. Implementation arrangement and responsibilities

8.3.1. Overall implementation responsibility

The overall responsibility of implementation of this EMP is under Contractor who will be in charge of the lines constructions in different districts of the Northen Province. District of the areas of intervention will designate a staff in charge of Environmental and Social safeguard who will be responsible for addressing environmental and social issues on a routine basis. The staff will have an oversight of environmental aspects of the construction contracts, including the enforcement of all monitoring provisions, etc. The project contractor will also have an Environmental Health and Safety officer to oversee the implementation of project during construction.

The main duties of the designated Environmental and social staffs will include but not limited to:

- Have an insight on the designs and ensure they adhere to the environmental and social specifications and the requirements of the Environmental and Social Management Plan (EMP).
- Co-ordinate and liaise with government institutions on environmental and social issues and obtaining the necessary clearances from the regulatory authorities.
- Collect and dissemination of relevant environmental documents

8.3.2. Roles and responsibilities of EDCL

EDCL as the proponent of the project, is responsible for the effective implementation of the project, in compliance with all approvals. EDCL must ensure compliance with the conditions inherent to the ESMP approval by RDB. EDCL shall therefore be the entity responsible for monitoring the implementation of the ESMP and compliance with the RDB Certificate of approval. However, EDCL will appoint a construction Contractor, who will be responsible for implementing the proposed construction power lines and hence implement the proposed mitigation measures documented in this ESMP. EDCL should also appoint an Environmental Supervising Consultant to monitor and report on compliance with ESMP, as has been elaborated upon below.

EDCL' s Environmental Specialist shall be the responsible 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 phase. The staff will be responsible for issuing instructions to the Contractor where environmental and social considerations call for action. The EDCL 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. The EDCL 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.

8.3.3. Role of the project coordination Unit

The project coordination Unit 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.

8.3.4. Contractor's role

Contractors will be responsible for complying with all relevant legislation and adhere to all mitigation measures specified in this ESIA and its ESMP. EDCL 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.

8.3.5. 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, RDB's approval conditions as well as contract provisions. The Environmental and Social Management Specialists shall work closely with EDCL 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.

8.3.6. Role of MININFRA

The Ministry of Infrastructures which is the ministry in charge of energy sector will be the project executing Ministry with the key role of developing and maintaining sustainable power generation and distribution facilities. It has also a big role in coordinating key stakeholdersinvolved in electrical energy transmission and distribution and in general develop policies and guidelines and laws related to energy generation and distribution.

8.3.7. Role of MINALOC

Under the framework of decentralization, MINALOC oversees the implementation of the decentralization process as well as relevant community and social protection programs. This Ministry is also responsible for environment governance and therefore for mobilizing the public to participate in the management and protection of natural resources. Via districts, MINALOC will oversee if and ensure that the project aims at the local development and that is implemented with zero or less harm to the local community

8.3.8. REMA's role

REMA as a lead agency responsible for the protection of the environment in Rwanda, REMA will undertake environmental audits to ensure that the project proponent enforces the ESMP and other environmental regulations. REMA will also conduct monitoring visits to verify if there are any emerging environmental issues arising from the projects activities that were not anticipated by the ESMP.

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8.3.9. Role of districts and other local authorities

During construction of the project, districts will be in position to undertake visits to assess compliance with the ESMP through a district environmental officer. The local authorities will also ensure that the development is in line with the proposed country development plan and the district's goals. They will also play a role of approving the valuation forms and ensuring that documentation in regard to the development are all in order.The district shall have a key in assisting the contractors through census, public consultation in relation to assets inventory of affected assets and properties etc.

8.3.10. Local communities' roles

The local communities play an important role in the project implementation 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. 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, E&S Supervising Consultant, EDCL, REMA and/or the WB and AfDB.

8.3.11. 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.

8.3.12. Grievance Redress Mechanism (GRM)

A grievance mechanism will be developed for potential use by all interested stakeholders. The aim of the grievance mechanism is to achieve mutually agreed resolution of grievances raised by such stakeholders. This grievance mechanism ensures that complaints and grievances are addressed in good faith and through a transparent and impartial process, but one which is culturally acceptable.

Grievances raised by stakeholders need to be managed through a transparent process, readily acceptable to all segments of affected communities and other stakeholders, at no cost and without retribution. The grievance mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the project and stakeholders, especially PAPs.

The types of grievances stakeholders may raise include, but are not limited to:

i. Negative impacts on communities, which may include, but not be limited to financial loss, physical harm and nuisance from construction or operational activities;

ii. Health and safety risks;
iii. Negative impacts on the environment such as pollution of water ways, soil, and air;
iv. Relocation of utilities, and
v. Unacceptable behavior by staff or employees.

It is critical that stakeholders understand that all grievances lodged, regardless of the project phase or activity being implemented, will follow one single mechanism. The mechanism must not impede access to other judicial or administrative remedies.

- **Objectives of Grievance Redress Mechanism (GRM)**

The GRM works within existing legal and cultural frameworks, providing an additional opportunity to resolve grievances at the local, project level. The key objectives of the GRM are:

i. Record, categorize and prioritize the grievances;
ii. Settle the grievances via consultation with all stakeholders (and inform those stakeholders of the solutions);
iii. Forward any unresolved cases to the relevant authority.

It is vital that appropriate signage is erected at the sites of all works providing the public with updated project information and summarising the GRM process, including contact details of the relevant Project Contact Person within the project implementation unit. Anyone shall be able to lodge a complaint and the methods (forms, in person, telephone, forms written in Kinyarwanda) should not inhibit the lodgement of any complaint. The grievance redress committee shall be composed of the PAPs representative, Village and Cell leader's representatives, women representative at cell level, client representative and consultant representative. The CRC members shall have the training on different topics related to the objectives of GRM prior to the commencement of the sub-project activities, especially the grievance redress mechanism, records and reporting system and others.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1. Conclusions

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 general findings of this EIA have revealed that most of the potential negative impacts to be generated by the development of the present project are minimal and can be avoided if the recommended mitigation measures are implemented. The sustainability of the proposed electrification project will be ensured by compliance with regulatory legislation regarding the proposed development. Thus, the project will be beneficial to the community and with implementation of proposed Environmental and Social Monitoring Plan, the project will be sustainable.

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. It is necessary to make sure mitigation measures are implemented continuously through on-site monitoring, reporting and intervention.

It is critical to realize 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 as well as planning around old trees and other significant environmental and social sites features. The pertaining impacts of the project have been assessed and described in detail to gain an adequate understanding of possible socio and environmental effects of the proposed project in all its implementation phases. When the mitigation measures listed in this document are fully implemented, it is no doubt that the project will benefit to both people and the environment. Projects benefits are outweighed than the negative impacts which mitigation plan has been prepared. Furthermore, project developer will carefully consider and apply all acceptable local and international standard/regulations at all stage through the implementation of the project.

In terms of resettlement implications, there is no physical resettlement expected from project implementation. However, land easement will be required at the pole's locations Further, income loss is expected during project works with loss of trees and crops. A proper planning is recommended to minimize such impacts. In any case potential disputed among workers arise, a project consultation with local leaders is proposed as a dispute resolution mechanism option available to redress grievances and disputes emanating from project activities. Therefore, based on the study findings, the Consultant is of the opinion that most of the potential environmental impacts identified can be mitigated. The proposed Environmental Management Plan and Environmental Monitoring Plan if implemented will safeguard the integrity of the environment. the potential impacts associated with the proposed development are of a nature and extent that can be reduced, limited, and eliminated by the application of appropriate mitigation measures.

9.2. 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:

- ✓ Before the implementation of the project starts, EDCL shall secure in full the locations of poles and project facilities such as transformer locations, materials storages sites etc. and this to be accomplished via fair compensation and land easement via negotiations with land owners.
- ✓ EDCL is recommended to take into consideration issues and concerns raised during public consultation especially issues related to compensation and jobs opportunity.
- ✓ 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 and /or international standards.
- ✓ Prior to the project implementation, EDCL is required to involve local authorities especially districts and establish a joint monitoring team including, Sectors and cell representatives in order to regularly monitor the

implementation of the proposed EMP.

- ✓ 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.
- ✓ The working environment should be monitored for occupational hazards relevant to this project.

The negative socio-cultural impacts associated to the project are very low as there is no involuntary settlement that may be associated to the project implementation. Hence, the project developer) should work closely with local authorities in raising awareness among local communities for the protection and maintenance of the project infrastructures.

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Annex 1: Environmental Management Plan (EMP) for Rulindo District

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
Pre-construction phase					
Survey of lines routes	Loss of trees and vegetation	- To follow standards and REG-EDCL procedures and practices in selection of the electrical line route in rural zones - Avoid areas with a lot of offs trees and crops	-Report on REG-EDCL clearance process based on Environmental Officer's field report Final line routes designs	REG-EDCL/EPC contractor, REMA, District	To be included in EPC contract's Budget
	Loss crops trees and perennial crops	- Valuation and compensation of affected assets	Compensation report	EDCL-MINIECOFIN	Cost to be covered in A-RAP
	PAPs complaints about their assets affected by survey team	- Establishment and operationalisation of GRM - Only clear areas earmarked only for the line route	Survey report	EDCL-EPC Contractor	17,000 (Estimated amount for meetings and transport allowance for members of committees-in 17 sectors of the project area)
Implementation of the project	No compliance in terms of environmental and social safeguards	- Recruitment of an Environmental safeguard and a Social Safeguard Officers	Employed environmental and Social Safeguard officers	REG-EDCL/ project funder	1,300*12months=15,000 (650 USD monthly salary for each Officer
Construction Phase					
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of biodiversity (e.g. trees, crops) due to alteration of the natural habitats, visual and auditory disturbance and damages due to the presence of equipment and workers	- To ensure that only those trees and other cover vegetation marked by the technical staff are cleared - Be informed about REG-EDCL procedures and practices in clearing sites and follow standards	-Number of trees felled and superficies of areas cleared for vegetation removal. -Report from EO observations on field -Report from DM&E of REG-EDCL	REG-EDCL/ /District REG-EDCL/ Contractor, REMA, Districts	To be included in EPC contract's Budget
	Impacting the ecological sensitive areas or wetlands through vegetation clearing	- Exploring the possibility of planting lower growing vegetation under below poles or reforestation nearby the power line corridor to	Availability of REG-EDCL procedure and practices document -Superficies of re-	REG-EDCL/EPC Contractor and District	PAPs contribution

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		restore natural habitats. - The choice of power lines route considered avoiding very sensitive and wetlands rich in biodiversity	vegetated areas -Report from site observations by EO -Power line route map		
	Risk of firing forests and natural habitats if cut trees and vegetation will be burnt	- Leave cut materials to rot down in situ and do not burn; - Leave a covering of grass and other lower vegetation on site - Sensitization on effected off bush fire	-Number of violations or illegal report	REG-EDCL/EPC Contractor and District	No budget is required
Clearing and excavation of Poles base and foundation;	Loose of natural vegetation and its biodiversity	- Protection of excavated soil materials from erosion and contamination by placing them away from stream of water on the slop or in direct line of local drainage.	-Reports on sites observations relatives to all practices recommended	REG-EDCL/ District	To be included in EPC contract's Budget and catered under construction budget
	Alteration of soil structure as well as exposure of soil to erosion.	- Loose soil should be kept covered till the time of backfill and excess soil removed and transferred to a dumping site	Monitoring report "	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Loose soil and construction materials will lead to damages of crops and soil contamination	- -Construction materials shall be storage within the footprint of the site to avoid any kind of damage and contamination of soil/crop adjoining	Monitoring report	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	If excavation will occur in swampy areas, water pumped would further increase erosion from surface runoff	- -Movement of materials and manpower shall be restricted to existing tracks to avoid creation of new ways	Monitoring report	EPC contractor	No budget required
Spotting plus erection of Poles & Conductors	Vegetation/crops in landing area could also be extensively damaged	- -Minimum clearing of trees and wherever possible trimming of trees will be adopted instead of felling them	-Number of trees felled or trimmed	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	Working at heights could present hazards to climbers and risks of falling objects on ground workers	- Protective measures should be ensured to workers including individual protective equipment	-Number of protective equipment provided to workers - Accident reports	EPC Contractor	7,500 (estimated 5 workers working at heigh with appropriate PPE costing 1,500 USD each)
	Working with cranes and other lifting equipment also present potential injury from broken wires, lifting tackle and swinging objects.	- First aid box and emergency medical coverage will be provided to workers.	-Report on cases of medical care provided to workers	EPC Contractor	Cost covered under risks of accidents, injuries and fatalities
	Stringing of lines can cause major traffic blockage where roads are crossed and/or create impacts on occupational health and safety	- At road crossing during stringing, the conductors will be elevated with the help of poles on either side of the road, to avoid any blockage to traffic	Report on sites observations relative to such practices	EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
Construction of poles base foundation	Collection of storm water leading to the creation of stagnant pools at the pole's bases	- -The ground surface of the pole sites shall be so graded as to gently provide water drainage away from the pole legs;	-Site visit report to confirm pole foundation design and construction	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget
Deliverance and mounting of appropriate strength electric equipment	Fall and trip hazards for workers and passersby during mounting of strength electric equipment Risk of poles failure resulting in societal hazards Stringing activity around low- or high-tension wires and other electrical units could be a potential hazard	- Reduce risks to workers and general public during erection of poles and mounting strength electrical equipment by putting warning signs (danger sign board) - -To ensure that safety margin is included in the design of poles to minimize the risk from any seismic activity or severe storm conditions	-Presence of warning signs or danger sign board visible -Report on verification of ordered poles or commands	REG-EDCL/ Contractor and District REG-EDCL/ Contractor and District	To be included in EPC contract's Budget and catered under construction budget "
Use of heavy lifting equipment to position the plant followed by wiring and connection	Risk of accidents during lifting equipment to position, erection of poles, stringing and wiring as well as connection	- -All vehicles containing heavy lifting equipment will be instructed to follow traffic norms strictly; - Ensure all` safety measures to workers and public including provision of protective safety equipment specific to works;	-Availability of traffic norms and report on its application -Number of protective equipment provided to workers -Report on cases of	REG-EDCL/Contractor and District	No cost required. The cost of first aid kit covered above

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		- First aid box and emergency medical coverage will be provided to workers.	medical care provided to workers		
Works for laying foundation, erection of poles, stringing time etc..	Transport of construction materials across agricultural fields, pose of conductors from pole to the next, all will lead damages to standing crops	- -Adequate compensation will need to be paid whose land/productivity is affected - Consultation and communication with affected persons landowners	-Minutes on the consultation and negotiation meeting with project affected persons (PAPs) -Report on payment and proof documents	REG-EDCL and District	Cost for compensation to be covered under A-RAP
Lines constructions	Clearing all vegetation, felling trees and crops plus removal of roots	- Reforestation nearby the power line corridor in order to restore natural habitats	-Number of trees planted -Superficies of re-vegetated areas	REG-EDCL/ District	To be covered under District ordinary Budget related to reforestation and environmental management
	Air pollution by gaseous like SO2, NOx, and CO to site peripheries exhausted from vehicles and machineries will lead to various chest and respiratory tract infections of human and animals	- Heavy machinery and vehicles regular inspected to reduce at minimal exhaust - Workers shall be equipped with personal protective materials	-Report on monthly inspection of vehicles -Number of personal protective equipment delivered to workers	REG-EDCL/EPC contractor and District	8,000 (estimated 200 workers with overall PPE costing 40 USD each)
	Incremental of stockpiled metal waste, concrete, earth and stones from demolished infrastructures	- All un-reused solid waste will be transferred to the dumping site selected and indicated by local administrative authority	-Report on the existence of dumping place -Site visit, all utilized areas are cleaned	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Scraping off unwanted topsoil layers will lead to soil loss washed to lowland area or to streams and rivers having as consequences drastic change in water quality, turbidity, and siltation phenomenon	- Erosion prevention mechanisms should be employed as much as possible, including avoid continuing works during heavy rain season	-Number of erosion control equipment installed	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Soil quality degradation will occur due to accumulation of earth	- Hydrocarbon residuals deposited on land, and accidental spills	-All excavated areas cleaned;	REG-EDCL/Contractor /District /MINAGRI and	To be included in EPC contract's Budget and catered

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	excavated materials and their deposit on the adjacent farmlands	should be dealt with as soon as they occur. - Prompt removal of all the affected soil and dumping this in clearly labelled metallic drums with lids for disposal later - All excavated soils shall be reused and remaining selected and transferred to ground indicated by local authority	-All measurements showed that soil quality and structure remained unchanged; -Site visit report on dumping site done by Environmental Officer	REMA	under construction budget
	Installation of cable trenches drains, can pose health and safety hazards to both workers and visitors.	- Workers will be provided with necessary protective equipment - -Avoid works nighttime and keep time for works' schedule	-Number of personal protectives equipped delivered to workers -Installation of warning signs on site	REG-EDCL/EPC Contractor / District	costing for PPEs is covered above
	Damages to existing electricity distribution lines and infrastructures during lighting by piping and cabling, which may produce negative impact on local services and nearby families.	- All nearby communities will be informed well in advance to works schedule and any changes which will arise accordingly. - Rapid electricity restoration should be envisaged.	-Program of works' schedule regularly advertised among public services and communities nearby -Number of letters sent or meetings organized with communities	REG-EDCL/EPC contractor and District	no cost is required
	Accumulation of excess construction materials and solid waste (parts of tip or pipe,) during installation of sanitary facilities equipment;	- -Cleaning of all traces of work, removal of the rest of materials, rubble, garbage - -Debris removal of water taps and pipes, cleaning of all sanitary equipment and their u-bend.	-Absence of remaining construction materials visible on the site -Landfill site available and has been monitored	REG-EDCL/ District	To be included in EPC contract's Budget and catered under construction budget
	Risk of high voltage electrocution to residents' people and passengers	- Placement of a metallic fence with iron mesh, properly grounded to protect people from high voltages	-Presence of metallic fence during site visit	REG-EDCL/EPC contractor	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	Risks of accidents, injuries and fatalities	- Implementation of occupational health and safety management Plan including training and toolbox talks - Provision of personnel protective equipment (safety shoes, helmets, gloves and visibility shirts) - Availability of first aid kit and first aid helper - Health and medical insurance for the site activities	Presence of safety personnel and training reports Number of PPE provided Number of available first aid Kits Proof insurance	REG-EDCL/EPC contractor/supervisor	12,000 (estimated of 200 employees and 100$/person 800 $ (one first aid kits for a team of 25People) 5000$ (Lump-Sum for 200 workers)
Operations of mounting appropriate equipment	Generation of abnormal vibration levels due to mounting equipment without solid support structure	- Pose of support structure that has sufficient mass and stiffness to permit the machine or equipment to operate in a state of equilibrium.	-Absence of abnormal noise or vibration from mounted equipment	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	Difficult of maintenance operations due to mounting equipment at a highly placed structure	- Utilization of a heavy lifting equipment to an appropriate position for facilitate maintenance - Avoid direct mounting of equipment on concrete or deck plate floors which introduces a resonance problem	-Number of heavy lifting equipment to be utilized -Number of equipment mounted on a solid support structure	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	During equipment installation there shall be risk of electrical shocks and fire outbreaks	- Automatic fire extinguishing system and heavy-duty ABC powder type fire extinguishers shall be available at particularly important electrical equipment areas. - Smoke detectors shall be in all critical areas	-Number of equipment such as smoke detector, extinguishers installed within a substation	REG-EDCL/EPC Contractor/REMA/EO	To be included in EPC contract's Budget and catered under construction budget
Worker's recruitment	Risk of child labour, sexual abuse and increase of HIV	- Recruitment should follow labour low, - Sensitization on HIV and sexual	Monitoring report	EPC contractor, EDCL/ nearby health centre	5,000 (to cater for MoU to be signed with the district hospital to provide sensitizations)

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		abuse should be conducted			
Operational & Maintenance Phase					
Maintenance of electrical principal equipment such as transformers	Unforeseen accidents such as fire outbreak leading to major oil spills of any hazardous materials during routine operations (e.g. transformer	- -Recuperation of oily liquid in a disposed basin and its transfer to a nearby prepared septic pit; - -Regular maintenance and keep a check on principal equipment	-Availability of a disposed basin -Constructed septic pit available -Strict calendar of equipment maintenance	REMA and District/Sector offices	To be covered Under REG-EDCL operational and line maintenance Budget
Control of land uses undertaken within the RoW	Risk of localized erosion during rainy season and creation of water pools around pole's feet	- -The ground surface at each poles site will be graded to provide drainage away from the poles and where necessary (e.g. on hillside) terracing, cribbing or riprap may be used to provide protection for poles foundations - -Planting grass cover will protect soil against erosion	-Site visit report to confirm pole foundation design and construction -Number of erosion equipment installed -Superficies of re-vegetated areas	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
The routine clearance of vegetation for maintaining adequate clearance along the route length	Regular clearance of vegetation and loose of its biodiversity Avian collision with power line may occur in big number if localized within migration corridor	- -Restrict clearance for the trees growing under the transmission line or branches overhanging the lines - -Visibility enhancement objects such as marker balls, bird deterrents or diverters shall be installed to avoid avian collision	-Hectares of vegetation cleared or trees' branches cut -Number of marker balls, bird deterrents or diverters installed	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
Maintaining operation and maintenance system	Ensure a better provision efficient operation and maintenance of electrical system in rural zones	- Technical field personnel should report power outages to the REG-EDCL and repair faults quickly - Public education to raise awareness of electricity danger and how to utilize the system safely - Improve supervision of field	-Monthly reports on power outages and faults repaired -Number of workshops organized or awareness meetings hold -Number of	REG-EDCL District and Sectors	To be covered Under REG-EDCL operational and line maintenance Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		workers and conduct system maintenance regularly and diligently	supervision missions to workers		
Total budget					**70,300**

Annex 2: Environmental Management Plan (EMP) for Musanze District

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
Pre-construction phase					
Survey of lines routes	Loss of trees and vegetation	- To follow standards and REG-EDCL procedures and practices in selection of the electrical line route in rural zones - Avoid areas with a lot of offs trees and crops	-Report on REG-EDCL clearance process based on Environmental Officer's field report Final line routes designs	REG-EDCL/EPC contractor, REMA, District	To be included in EPC contract's Budget
	Loss crops trees and perennial crops	- Valuation and compensation of affected assets	Compensation report	EDCL-MINIECOFIN	cost to be covered in A-RAP
	PAPs complaints about their assets affected by survey team	- Establishment and operationalisation of GRM - Only clear areas earmarked only for the line route	Survey report	EDCL-EPC Contractor	15,000 (Estimated amount for meetings and transport allowance for members of committees-in 15 sectors of the project area)
Implementation of the project	No compliance in terms of environmental and social safeguards	- Recruitment of an Environmental safeguard and a Social Safeguard Officers	Employed environmental and Social Safeguard officers	REG-EDCL/ project funder	1,300*12months=15,000 (650 USD monthly salary for each Officer
Construction Phase					
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of biodiversity (e.g. trees, crops) due to alteration of the natural habitats, visual and auditory disturbance and	- To ensure that only those trees and other cover vegetation marked by the technical staff are cleared	-Number of trees felled and superficies of areas cleared for vegetation removal.	REG-EDCL/ /District REG-EDCL/ Contractor, REMA, District	To be included in EPC contract's Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	damages due to the presence of equipment and workers	- Be informed about REG-EDCL procedures and practices in clearing sites and follow standards	-Report from EO observations on field -Report from DM&E of REG-EDCL		
	Impacting the ecological sensitive areas or wetlands through vegetation clearing	- Exploring the possibility of planting lower growing vegetation under below poles or reforestation nearby the power line corridor to restore natural habitats. - The choice of power lines route considered avoiding very sensitive and wetlands rich in biodiversity	Availability of REG-EDCL procedure and practices document -Superficies of re-vegetated areas -Report from site observations by EO -Power line route map	REG-EDCL/EPC Contractor and District	PAPs contribution
	Risk of firing forests and natural habitats if cut trees and vegetation will be burnt	- Leave cut materials to rot down in situ and do not burn; - Leave a covering of grass and other lower vegetation on site - Sensitization on effected off bush fire	-Number of violations or illegal report	REG-EDCL/EPC Contractor and District	No budget is required
Clearing and excavation of Poles base and foundation;	Loose of natural vegetation and its biodiversity	- Protection of excavated soil materials from erosion and contamination by placing them away from stream of water on the slop or in direct line of local drainage.	-Reports on sites observations relatives to all practices recommended	REG-EDCL/ and District	To be included in EPC contract's Budget and catered under construction budget
	Alteration of soil structure as well as exposure of soil to erosion.	- Loose soil should be kept covered till the time of backfill and excess soil removed and transferred to a dumping site	Monitoring report "	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Loose soil and construction materials will lead to damages of crops and soil contamination	- -Construction materials shall be storage within the footprint of the site to avoid any kind of damage and contamination of soil/crop adjoining	Monitoring report	EPC contractor	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	If excavation will occur in swampy areas, water pumped would further increase erosion from surface runoff	- -Movement of materials and manpower shall be restricted to existing tracks to avoid creation of new ways	Monitoring report	EPC contractor	No budget required
Spotting plus erection of Poles & Conductors	Vegetation/crops in landing area could also be extensively damaged	- -Minimum clearing of trees and wherever possible trimming of trees will be adopted instead of felling them	-Number of trees felled or trimmed	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Working at heights could present hazards to climbers and risks of falling objects on ground workers	- Protective measures should be ensured to workers including individual protective equipment	-Number of protective equipment provided to workers - Accident reports	EPC Contractor	7,500 (estimated 5 workers working at heigh with appropriate PPE costing 1,500 USD each)
	Working with cranes and other lifting equipment also present potential injury from broken wires, lifting tackle and swinging objects.	- First aid box and emergency medical coverage will be provided to workers.	-Report on cases of medical care provided to workers	EPC Contractor	Cost covered under risks of accidents, injuries and fatalities
	Stringing of lines can cause major traffic blockage where roads are crossed and/or create impacts on occupational health and safety	- At road crossing during stringing, the conductors will be elevated with the help of poles on either side of the road, to avoid any blockage to traffic	Report on sites observations relative to such practices	EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
Construction of poles base foundation	Collection of storm water leading to the creation of stagnant pools at the pole's bases	- -The ground surface of the pole sites shall be so graded as to gently provide water drainage away from the pole legs;	-Site visit report to confirm pole foundation design and construction	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget
Deliverance and mounting of appropriate strength electric equipment	Fall and trip hazards for workers and passersby during mounting of strength electric equipment Risk of poles failure resulting in societal hazards Stringing activity around low- or high-tension wires and other electrical units could be a	- Reduce risks to workers and general public during erection of poles and mounting strength electrical equipment by putting warning signs (danger sign board) - -To ensure that safety margin is included in the design of poles to minimize the risk from any seismic	-Presence of warning signs or danger sign board visible -Report on verification of ordered poles or commands	REG-EDCL/ Contractor and District REG-EDCL/ Contractor and District	To be included in EPC contract's Budget and catered under construction budget "

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	potential hazard	activity or severe storm conditions			
Use of heavy lifting equipment to position the plant followed by wiring and connection	Risk of accidents during lifting equipment to position, erection of poles, stringing and wiring as well as connection	- -All vehicles containing heavy lifting equipment will be instructed to follow traffic norms strictly; - Ensure all` safety measures to workers and public including provision of protective safety equipment specific to works; - First aid box and emergency medical coverage will be provided to workers.	-Availability of traffic norms and report on its application -Number of protective equipment provided to workers -Report on cases of medical care provided to workers	REG-EDCL/Contractor and District	No cost required. The cost of first aid kit covered above
Works for laying foundation, erection of poles, stringing time etc..	Transport of construction materials across agricultural fields, pose of conductors from pole to the next, all will lead damages to standing crops	- -Adequate compensation will need to be paid whose land/productivity is affected - Consultation and communication with affected persons landowners	-Minutes on the consultation and negotiation meeting with project affected persons (PAPs) -Report on payment and proof documents	REG-EDCL and District	Cost for compensation to be covered under A-RAP
Lines constructions	Clearing all vegetation, felling trees and crops plus removal of roots	- Reforestation nearby the power line corridor in order to restore natural habitats	-Number of trees planted -Superficies of re-vegetated areas	REG-EDCL/OIA and District	To be covered under District ordinary Budget related to reforestation and environmental management
	Air pollution by gaseous like SO2, NOx, and CO to site peripheries exhausted from vehicles and machineries will lead to various chest and respiratory tract infections of human and animals	- Heavy machinery and vehicles regular inspected to reduce at minimal exhaust - Workers shall be equipped with personal protective materials	-Report on monthly inspection of vehicles -Number of personal protective equipment delivered to workers	REG-EDCL/EPC contractor and District	6,000 (estimated 150 workers with overall PPE costing 40 USD each)
	Incremental of stockpiled metal waste, concrete, earth and stones from demolished infrastructures	- All un-reused solid waste will be transferred to the dumping site selected and indicated by local administrative authority	-Report on the existence of dumping place -Site visit, all utilized areas are cleaned	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Scraping off unwanted topsoil	- Erosion prevention mechanisms	-Number of erosion	REG-EDCL/EPC	To be included in EPC

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	layers will lead to soil loss washed to lowland area or to streams and rivers having as consequences drastic change in water quality, turbidity, and siltation phenomenon	should be employed as much as possible, including avoid continuing works during heavy rain season	control equipment installed	contractor and District	contract's Budget and catered under construction budget
	Soil quality degradation will occur due to accumulation of earth excavated materials and their deposit on the adjacent farmlands	- Hydrocarbon residuals deposited on land, and accidental spills should be dealt with as soon as they occur. - Prompt removal of all the affected soil and dumping this in clearly labelled metallic drums with lids for disposal later - All excavated soils shall be reused and remaining selected and transferred to ground indicated by local authority	-All excavated areas cleaned; -All measurements showed that soil quality and structure remained unchanged; -Site visit report on dumping site done by Environmental Officer	REG-EDCL/Contractor /District /MINAGRI and REMA	To be included in EPC contract's Budget and catered under construction budget
	Installation of cable trenches drains, can pose health and safety hazards to both workers and visitors.	- Workers will be provided with necessary protective equipment - -Avoid works nighttime and keep time for works' schedule	-Number of personal protectives equipped delivered to workers -Installation of warning signs on site	REG-EDCL/EPC Contractor / District/	costing for PPEs is covered above
	Damages to existing electricity distribution lines and infrastructures during lighting by piping and cabling, which may produce negative impact on local services and nearby families.	- All nearby communities will be informed well in advance to works schedule and any changes which will arise accordingly. - Rapid electricity restoration should be envisaged.	-Program of works' schedule regularly advertised among public services and communities nearby -Number of letters sent or meetings organized with communities	REG-EDCL/EPC contractor and Districts	no cost is required
	Accumulation of excess construction materials and solid	- -Cleaning of all traces of work, removal of the rest of materials,	-Absence of remaining	REG-EDCL/OIA and District	To be included in EPC contract's Budget and catered

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	waste (parts of tip or pipe,) during installation of sanitary facilities equipment;	rubble, garbage - -Debris removal of water taps and pipes, cleaning of all sanitary equipment and their u-bend.	construction materials visible on the site -Landfill site available and has been monitored		under construction budget
	Risk of high voltage electrocution to residents' people and passengers	- Placement of a metallic fence with iron mesh, properly grounded to protect people from high voltages	-Presence of metallic fence during site visit	REG-EDCL/EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Risks of accidents, injuries and fatalities	- Implementation of occupational health and safety management Plan including training and toolbox talks - Provision of personnel protective equipment (safety shoes, helmets, gloves and visibility shirts) - Availability of first aid kit and first aid helper - Health and medical insurance for the site activities	Presence of safety personnel and training reports Number of PPE provided Number of available first aid Kits Proof insurance	REG-EDCL/EPC contractor/supervisor	15,000(estimated of 150 employees and 100$/person 800 $(one first aid kits for a team of 25People) 4000$ (Lump-Sum for 150 workers)
Operations of mounting appropriate equipment	Generation of abnormal vibration levels due to mounting equipment without solid support structure	- Pose of support structure that has sufficient mass and stiffness to permit the machine or equipment to operate in a state of equilibrium.	-Absence of abnormal noise or vibration from mounted equipment	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	Difficult of maintenance operations due to mounting equipment at a highly placed structure	- Utilization of a heavy lifting equipment to an appropriate position for facilitate maintenance - Avoid direct mounting of equipment on concrete or deck plate floors which introduces a resonance problem	-Number of heavy lifting equipment to be utilized -Number of equipment mounted on a solid support structure	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	During equipment installation there shall be risk of electrical	- Automatic fire extinguishing system and heavy-duty ABC	-Number of equipment such as	REG-EDCL/EPC Contractor/REMA/EO	To be included in EPC contract's Budget and catered

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	shocks and fire outbreaks	powder type fire extinguishers shall be available at particularly important electrical equipment areas. - Smoke detectors shall be in all critical areas	smoke detector, extinguishers installed within a substation		under construction budget
Worker's recruitment	Risk of child labour, sexual abuse and increase of HIV	- Recruitment should follow labour low, - Sensitization on HIV and sexual abuse should be conducted	Monitoring report	EPC contractor, EDCL/ nearby health centre	5,000 (to cater for MoU to be signed with the district hospital to provide sensitizations)
Operational & Maintenance Phase					
Maintenance of electrical principal equipment such as transformers	Unforeseen accidents such as fire outbreak leading to major oil spills of any hazardous materials during routine operations (e.g. transformer	- -Recuperation of oily liquid in a disposed basin and its transfer to a nearby prepared septic pit; - -Regular maintenance and keep a check on principal equipment	-Availability of a disposed basin -Constructed septic pit available -Strict calendar of equipment maintenance	REMA and District/Sector offices	To be covered Under REG-EDCL operational and line maintenance Budget
Control of land uses undertaken within the RoW	Risk of localized erosion during rainy season and creation of water pools around pole's feet	- -The ground surface at each poles site will be graded to provide drainage away from the poles and where necessary (e.g. on hillside) terracing, cribbing or riprap may be used to provide protection for poles foundations - -Planting grass cover will protect soil against erosion	-Site visit report to confirm pole foundation design and construction -Number of erosion equipment installed -Superficies of re-vegetated areas	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
The routine clearance of vegetation for maintaining adequate clearance along the route length	Regular clearance of vegetation and loose of its biodiversity Avian collision with power line may occur in big number if localized within migration corridor	- -Restrict clearance for the trees growing under the transmission line or branches overhanging the lines - -Visibility enhancement objects such as marker balls, bird deterrents or diverters shall be	-Hectares of vegetation cleared or trees' branches cut -Number of marker balls, bird deterrents or diverters installed	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		installed to avoid avian collision			
Maintaining operation and maintenance system	Ensure a better provision efficient operation and maintenance of electrical system in rural zones	- Technical field personnel should report power outages to the REG-EDCL and repair faults quickly - Public education to raise awareness of electricity danger and how to utilize the system safely - Improve supervision of field workers and conduct system maintenance regularly and diligently	-Monthly reports on power outages and faults repaired -Number of workshops organized or awareness meetings hold -Number of supervision missions to workers	REG-EDCL District and Sectors	To be covered Under REG-EDCL operational and line maintenance Budget
Total budget					**49,800**

Annex 3: Environmental Management Plan (EMP) for Gicumbi District

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
Pre-construction phase					
Survey of lines routes	Loss of trees and vegetation	- To follow standards and REG-EDCL procedures and practices in selection of the electrical line route in rural zones - Avoid areas with a lot of offs trees and crops	-Report on REG-EDCL clearance process based on Environmental Officer's field report Final line routes designs	REG-EDCL/EPC contractor, REMA, District	To be included in EPC contract's Budget
	Loss crops trees and perennial crops	- Valuation and compensation of affected assets	Compensation report	EDCL-MINIECOFIN	cost to be covered in A-RAP
	PAPs complaints about their assets affected by survey team	- Establishment and operationalisation of GRM - Only clear areas earmarked only for the line route	Survey report	EDCL-EPC Contractor	21,000 (Estimated amount for meetings and transport allowance for members of committees-in 21 sectors of the project area)

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
Implementation of the project	No compliance in terms of environmental and social safeguards	- Recruitment of an Environmental safeguard and a Social Safeguard Officers	Employed environmental and Social Safeguard officers	REG-EDCL/ project funder	1,300*12months=15,000 (650 USD monthly salary for each Officer
Construction Phase					
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of biodiversity (e.g. trees, crops) due to alteration of the natural habitats, visual and auditory disturbance and damages due to the presence of equipment and workers	- To ensure that only those trees and other cover vegetation marked by the technical staff are cleared - Be informed about REG-EDCL procedures and practices in clearing sites and follow standards	-Number of trees felled and superficies of areas cleared for vegetation removal. -Report from EO observations on field -Report from DM&E of REG-EDCL	REG-EDCL/ /District REG-EDCL/ Contractor, REMA, District	To be included in EPC contract's Budget
	Impacting the ecological sensitive areas or wetlands through vegetation clearing	- Exploring the possibility of planting lower growing vegetation under below poles or reforestation nearby the power line corridor to restore natural habitats. - The choice of power lines route considered avoiding very sensitive and wetlands rich in biodiversity	Availability of REG-EDCL procedure and practices document -Superficies of re-vegetated areas -Report from site observations by EO -Power line route map	REG-EDCL/EPC Contractor and District	PAPs contribution
	Risk of firing forests and natural habitats if cut trees and vegetation will be burnt	- Leave cut materials to rot down in situ and do not burn; - Leave a covering of grass and other lower vegetation on site - Sensitization on effected off bush fire	-Number of violations or illegal report	REG-EDCL/EPC Contractor and District	No budget is required
Clearing and excavation of Poles base and foundation;	Loose of natural vegetation and its biodiversity	- Protection of excavated soil materials from erosion and contamination by placing them away from stream of water on the slop or in direct line of local drainage.	-Reports on sites observations relatives to all practices recommended	REG-EDCL/District	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	Alteration of soil structure as well as exposure of soil to erosion.	- Loose soil should be kept covered till the time of backfill and excess soil removed and transferred to a dumping site	Monitoring report “	EPC contractor	To be included in EPC contract’s Budget and catered under construction budget
	Loose soil and construction materials will lead to damages of crops and soil contamination	- -Construction materials shall be storage within the footprint of the site to avoid any kind of damage and contamination of soil/crop adjoining	Monitoring report	EPC contractor	To be included in EPC contract’s Budget and catered under construction budget
	If excavation will occur in swampy areas, water pumped would further increase erosion from surface runoff	- -Movement of materials and manpower shall be restricted to existing tracks to avoid creation of new ways	Monitoring report	EPC contractor	No budget required
Spotting plus erection of Poles & Conductors	Vegetation/crops in landing area could also be extensively damaged	- -Minimum clearing of trees and wherever possible trimming of trees will be adopted instead of felling them	-Number of trees felled or trimmed	REG-EDCL/EPC Contractor and District	To be included in EPC contract’s Budget and catered under construction budget
	Working at heights could present hazards to climbers and risks of falling objects on ground workers	- Protective measures should be ensured to workers including individual protective equipment	-Number of protective equipment provided to workers - Accident reports	EPC Contractor	105,000 (estimated 7 workers working at heigh with appropriate PPE costing 1,500 USD each)
	Working with cranes and other lifting equipment also present potential injury from broken wires, lifting tackle and swinging objects.	- First aid box and emergency medical coverage will be provided to workers.	-Report on cases of medical care provided to workers	EPC Contractor	Cost covered under risks of accidents, injuries and fatalities
	Stringing of lines can cause major traffic blockage where roads are crossed and/or create impacts on occupational health and safety	- At road crossing during stringing, the conductors will be elevated with the help of poles on either side of the road, to avoid any blockage to traffic	Report on sites observations relative to such practices	EPC Contractor	To be included in EPC contract’s Budget and catered under construction budget
Construction of poles base foundation	Collection of storm water leading to the creation of stagnant pools at the pole’s bases	- -The ground surface of the pole sites shall be so graded as to gently provide water drainage	-Site visit report to confirm pole foundation design	REG-EDCL/EPC Contractor and District	To be included in EPC contract’s Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		away from the pole legs;	and construction		
Deliverance and mounting of appropriate strength electric equipment	Fall and trip hazards for workers and passersby during mounting of strength electric equipment Risk of poles failure resulting in societal hazards Stringing activity around low- or high-tension wires and other electrical units could be a potential hazard	- Reduce risks to workers and general public during erection of poles and mounting strength electrical equipment by putting warning signs (danger sign board) - -To ensure that safety margin is included in the design of poles to minimize the risk from any seismic activity or severe storm conditions	-Presence of warning signs or danger sign board visible -Report on verification of ordered poles or commands	REG-EDCL/ Contractor and District REG-EDCL/ Contractor and District	To be included in EPC contract's Budget and catered under construction budget "
Use of heavy lifting equipment to position the plant followed by wiring and connection	Risk of accidents during lifting equipment to position, erection of poles, stringing and wiring as well as connection	- -All vehicles containing heavy lifting equipment will be instructed to follow traffic norms strictly; - Ensure all` safety measures to workers and public including provision of protective safety equipment specific to works; - First aid box and emergency medical coverage will be provided to workers.	-Availability of traffic norms and report on its application -Number of protective equipment provided to workers -Report on cases of medical care provided to workers	REG-EDCL/Contractor and District	No cost required. The cost of first aid kit covered above
Works for laying foundation, erection of poles, stringing time etc..	Transport of construction materials across agricultural fields, pose of conductors from pole to the next, all will lead damages to standing crops	- -Adequate compensation will need to be paid whose land/productivity is affected - Consultation and communication with affected persons landowners	-Minutes on the consultation and negotiation meeting with project affected persons (PAPs) -Report on payment and proof documents	REG-EDCL and District	Cost for compensation to be covered under A-RAP
Lines constructions	Clearing all vegetation, felling trees and crops plus removal of roots	- Reforestation nearby the power line corridor in order to restore natural habitats	-Number of trees planted -Superficies of re-vegetated areas	REG-EDCL/OIA and District	To be covered under District ordinary Budget related to reforestation and environmental management
	Air pollution by gaseous like SO2, NOx, and CO to site peripheries exhausted from vehicles and	- Heavy machinery and vehicles regular inspected to reduce at minimal exhaust	-Report on monthly inspection of vehicles -Number of personal	REG-EDCL/EPC contractor and District	12,000 (estimated 300 workers with overall PPE costing 40 USD

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	machineries will lead to various chest and respiratory tract infections of human and animals	- Workers shall be equipped with personal protective materials	protective equipment delivered to workers		each)
	Incremental of stockpiled metal waste, concrete, earth and stones from demolished infrastructures	- All un-reused solid waste will be transferred to the dumping site selected and indicated by local administrative authority	-Report on the existence of dumping place -Site visit, all utilized areas are cleaned	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Scraping off unwanted topsoil layers will lead to soil loss washed to lowland area or to streams and rivers having as consequences drastic change in water quality, turbidity, and siltation phenomenon	- Erosion prevention mechanisms should be employed as much as possible, including avoid continuing works during heavy rain season	-Number of erosion control equipment installed	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Soil quality degradation will occur due to accumulation of earth excavated materials and their deposit on the adjacent farmlands	- Hydrocarbon residuals deposited on land, and accidental spills should be dealt with as soon as they occur. - Prompt removal of all the affected soil and dumping this in clearly labelled metallic drums with lids for disposal later - All excavated soils shall be reused and remaining selected and transferred to ground indicated by local authority	-All excavated areas cleaned; -All measurements showed that soil quality and structure remained unchanged; -Site visit report on dumping site done by Environmental Officer	REG-EDCL/Contractor /District /MINAGRI and REMA	To be included in EPC contract's Budget and catered under construction budget
	Installation of cable trenches drains, can pose health and safety hazards to both workers and visitors.	- Workers will be provided with necessary protective equipment - -Avoid works nighttime and keep time for works' schedule	-Number of personal protectives equipped delivered to workers -Installation of warning signs on site	REG-EDCL/EPC Contractor District/	costing for PPEs is covered above
	Damages to existing electricity distribution lines and	- All nearby communities will be informed well in advance to works	-Program of works' schedule regularly	REG-EDCL/EPC contractor and District	no cost is required

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	infrastructures during lighting by piping and cabling, which may produce negative impact on local services and nearby families.	schedule and any changes which will arise accordingly. - Rapid electricity restoration should be envisaged.	advertised among public services and communities nearby -Number of letters sent or meetings organized with communities		
	Accumulation of excess construction materials and solid waste (parts of tip or pipe,) during installation of sanitary facilities equipment;	- -Cleaning of all traces of work, removal of the rest of materials, rubble, garbage - -Debris removal of water taps and pipes, cleaning of all sanitary equipment and their u-bend.	-Absence of remaining construction materials visible on the site -Landfill site available and has been monitored	REG-EDCL/District	To be included in EPC contract's Budget and catered under construction budget
	Risk of high voltage electrocution to residents' people and passengers	- Placement of a metallic fence with iron mesh, properly grounded to protect people from high voltages	-Presence of metallic fence during site visit	REG-EDCL/EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Risks of accidents, injuries and fatalities	- Implementation of occupational health and safety management Plan including training and toolbox talks - Provision of personnel protective equipment (safety shoes, helmets, gloves and visibility shirts) - Availability of first aid kit and first aid helper - Health and medical insurance for the site activities	Presence of safety personnel and training reports Number of PPE provided Number of available first aid Kits Proof insurance	REG-EDCL/EPC contractor/supervisor	30,000 (estimated of 300 employees and 100$/person 900 $(one first aid kits for a team of 25People) 6000$ (Lump-Sum for 300 workers)
Operations of mounting appropriate equipment	Generation of abnormal vibration levels due to mounting equipment without solid support structure	- Pose of support structure that has sufficient mass and stiffness to permit the machine or equipment to operate in a state of equilibrium.	-Absence of abnormal noise or vibration from mounted equipment	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	Difficult of maintenance operations due to mounting equipment at a highly placed structure	- Utilization of a heavy lifting equipment to an appropriate position for facilitate maintenance - Avoid direct mounting of equipment on concrete or deck plate floors which introduces a resonance problem	-Number of heavy lifting equipment to be utilized -Number of equipment mounted on a solid support structure	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	During equipment installation there shall be risk of electrical shocks and fire outbreaks	- Automatic fire extinguishing system and heavy-duty ABC powder type fire extinguishers shall be available at particularly important electrical equipment areas. - Smoke detectors shall be in all critical areas	-Number of equipment such as smoke detector, extinguishers installed within a substation	REG-EDCL/EPC Contractor /REMA/EO	To be included in EPC contract's Budget and catered under construction budget
Worker's recruitment	Risk of child labour, sexual abuse and increase of HIV	- Recruitment should follow labour low, - Sensitization on HIV and sexual abuse should be conducted	Monitoring report	EPC contractor, EDCL/ nearby health centre)	5,000 (to cater for MoU to be signed with the district hospital to provide sensitizations)
Operational & Maintenance Phase					
Maintenance of electrical principal equipment such as transformers	Unforeseen accidents such as fire outbreak leading to major oil spills of any hazardous materials during routine operations (e.g. transformer	- -Recuperation of oily liquid in a disposed basin and its transfer to a nearby prepared septic pit; - -Regular maintenance and keep a check on principal equipment	-Availability of a disposed basin -Constructed septic pit available -Strict calendar of equipment maintenance	REMA and District/Sector offices	To be covered Under REG-EDCL operational and line maintenance Budget
Control of land uses undertaken within the RoW	Risk of localized erosion during rainy season and creation of water pools around pole's feet	- -The ground surface at each poles site will be graded to provide drainage away from the poles and where necessary (e.g. on hillside) terracing, cribbing or riprap may be used to provide protection for poles foundations	-Site visit report to confirm pole foundation design and construction -Number of erosion equipment installed	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		- -Planting grass cover will protect soil against erosion	-Superficies of re-vegetated areas		
The routine clearance of vegetation for maintaining adequate clearance along the route length	Regular clearance of vegetation and loose of its biodiversity Avian collision with power line may occur in big number if localized within migration corridor	- -Restrict clearance for the trees growing under the transmission line or branches overhanging the lines - -Visibility enhancement objects such as marker balls, bird deterrents or diverters shall be installed to avoid avian collision	-Hectares of vegetation cleared or trees' branches cut -Number of marker balls, bird deterrents or diverters installed	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
Maintaining operation and maintenance system	Ensure a better provision efficient operation and maintenance of electrical system in rural zones	- Technical field personnel should report power outages to the REG-EDCL and repair faults quickly - Public education to raise awareness of electricity danger and how to utilize the system safely - Improve supervision of field workers and conduct system maintenance regularly and diligently	-Monthly reports on power outages and faults repaired -Number of workshops organized or awareness meetings hold -Number of supervision missions to workers	REG-EDCL District and Sectors	To be covered Under REG-EDCL operational and line maintenance Budget
Total budget					**189,900**

Annex 4: Environmental Management Plan (EMP) for Gakenke District

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
Pre-construction phase					
Survey of lines routes	Loss of trees and vegetation	- To follow standards and REG-EDCL procedures and practices in selection of the electrical line route in rural zones - Avoid areas with a lot of offs trees and crops	-Report on REG-EDCL clearance process based on Environmental Officer's field report Final line routes	REG-EDCL/EPC contractor, REMA, District	To be included in EPC contract's Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
			designs		
	Loss crops trees and perennial crops	- Valuation and compensation of affected assets	Compensation report	EDCL-MINIECOFIN	cost to be covered in A-RAP
	PAPs complaints about their assets affected by survey team	- Establishment and operationalisation of GRM - Only clear areas earmarked only for the line route	Survey report	EDCL-EPC Contractor	19,000 (Estimated amount for meetings and transport allowance for members of committees-in 19 sectors making the project area)
Implementation of the project	No compliance in terms of environmental and social safeguards	- Recruitment of an Environmental safeguard and a Social Safeguard Officers	Employed environmental and Social Safeguard officers	REG-EDCL/ project funder	1,300*12months=15,000 (650 USD monthly salary for each Officer
Construction Phase					
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of biodiversity (e.g. trees, crops) due to alteration of the natural habitats, visual and auditory disturbance and damages due to the presence of equipment and workers	- To ensure that only those trees and other cover vegetation marked by the technical staff are cleared - Be informed about REG-EDCL procedures and practices in clearing sites and follow standards	-Number of trees felled and superficies of areas cleared for vegetation removal. -Report from EO observations on field -Report from DM&E of REG-EDCL	REG-EDCL/ /District REG-EDCL/ Contractor, REMA, District	To be included in EPC contract's Budget
	Impacting the ecological sensitive areas or wetlands through vegetation clearing	- Exploring the possibility of planting lower growing vegetation under below poles or reforestation nearby the power line corridor to restore natural habitats. - The choice of power lines route considered avoiding very sensitive and wetlands rich in biodiversity	Availability of REG-EDCL procedure and practices document -Superficies of re-vegetated areas -Report from site observations by EO -Power line route map	REG-EDCL/EPC Contractor and District	PAPs contribution
	Risk of firing forests and natural habitats if cut trees and vegetation will be burnt	- Leave cut materials to rot down in situ and do not burn; - Leave a covering of grass and	-Number of violations or illegal report	REG-EDCL/EPC Contractor and District	No budget is required

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		other lower vegetation on site - Sensitization on effected off bush fire			
Clearing and excavation of Poles base and foundation;	Loose of natural vegetation and its biodiversity	- Protection of excavated soil materials from erosion and contamination by placing them away from stream of water on the slop or in direct line of local drainage.	-Reports on sites observations relatives to all practices recommended	REG-EDCL/ District	To be included in EPC contract's Budget and catered under construction budget
	Alteration of soil structure as well as exposure of soil to erosion.	- Loose soil should be kept covered till the time of backfill and excess soil removed and transferred to a dumping site	Monitoring report "	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Loose soil and construction materials will lead to damages of crops and soil contamination	- -Construction materials shall be storage within the footprint of the site to avoid any kind of damage and contamination of soil/crop adjoining	Monitoring report	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	If excavation will occur in swampy areas, water pumped would further increase erosion from surface runoff	- -Movement of materials and manpower shall be restricted to existing tracks to avoid creation of new ways	Monitoring report	EPC contractor	No budget required
Spotting plus erection of Poles & Conductors	Vegetation/crops in landing area could also be extensively damaged	- -Minimum clearing of trees and wherever possible trimming of trees will be adopted instead of felling them	-Number of trees felled or trimmed	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Working at heights could present hazards to climbers and risks of falling objects on ground workers	- Protective measures should be ensured to workers including individual protective equipment	-Number of protective equipment provided to workers - Accident reports	EPC Contractor	7,500 (estimated 5 workers working at heigh with appropriate PPE costing 1,500 USD each)
	Working with cranes and other lifting equipment also present potential injury from broken wires, lifting tackle and swinging	- First aid box and emergency medical coverage will be provided to workers.	-Report on cases of medical care provided to workers	EPC Contractor	Cost covered under risks of accidents, injuries and fatalities

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	objects.				
	Stringing of lines can cause major traffic blockage where roads are crossed and/or create impacts on occupational health and safety	- At road crossing during stringing, the conductors will be elevated with the help of poles on either side of the road, to avoid any blockage to traffic	Report on sites observations relative to such practices	EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
Construction of poles base foundation	Collection of storm water leading to the creation of stagnant pools at the pole's bases	- -The ground surface of the pole sites shall be so graded as to gently provide water drainage away from the pole legs;	-Site visit report to confirm pole foundation design and construction	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget
Deliverance and mounting of appropriate strength electric equipment	Fall and trip hazards for workers and passersby during mounting of strength electric equipment Risk of poles failure resulting in societal hazards Stringing activity around low- or high-tension wires and other electrical units could be a potential hazard	- Reduce risks to workers and general public during erection of poles and mounting strength electrical equipment by putting warning signs (danger sign board) - -To ensure that safety margin is included in the design of poles to minimize the risk from any seismic activity or severe storm conditions	-Presence of warning signs or danger sign board visible -Report on verification of ordered poles or commands	REG-EDCL/ Contractor and District REG-EDCL/ Contractor and District	To be included in EPC contract's Budget and catered under construction budget "
Use of heavy lifting equipment to position the plant followed by wiring and connection	Risk of accidents during lifting equipment to position, erection of poles, stringing and wiring as well as connection	- -All vehicles containing heavy lifting equipment will be instructed to follow traffic norms strictly; - Ensure all` safety measures to workers and public including provision of protective safety equipment specific to works; - First aid box and emergency medical coverage will be provided to workers.	-Availability of traffic norms and report on its application -Number of protective equipment provided to workers -Report on cases of medical care provided to workers	REG-EDCL/Contractor and District	No cost required. The cost of first aid kit covered above
Works for laying foundation, erection of poles, stringing time etc..	Transport of construction materials across agricultural fields, pose of conductors from pole to the next, all will lead damages to standing crops	- -Adequate compensation will need to be paid whose land/productivity is affected - Consultation and communication with affected persons landowners	-Minutes on the consultation and negotiation meeting with project affected persons (PAPs)	REG-EDCL and District	Cost for compensation to be covered under A-RAP

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
			-Report on payment and proof documents		
Lines constructions	Clearing all vegetation, felling trees and crops plus removal of roots	- Reforestation nearby the power line corridor in order to restore natural habitats	-Number of trees planted -Superficies of re-vegetated areas	REG-EDCL/OIA and District	To be covered under District ordinary Budget related to reforestation and environmental management
	Air pollution by gaseous like SO2, NOx, and CO to site peripheries exhausted from vehicles and machineries will lead to various chest and respiratory tract infections of human and animals	- Heavy machinery and vehicles regular inspected to reduce at minimal exhaust - Workers shall be equipped with personal protective materials	-Report on monthly inspection of vehicles -Number of personal protective equipment delivered to workers	REG-EDCL/EPC contractor and District	8,000 (estimated 200 workers with overall PPE costing 40 USD each)
	Incremental of stockpiled metal waste, concrete, earth and stones from demolished infrastructures	- All un-reused solid waste will be transferred to the dumping site selected and indicated by local administrative authority	-Report on the existence of dumping place -Site visit, all utilized areas are cleaned	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Scraping off unwanted topsoil layers will lead to soil loss washed to lowland area or to streams and rivers having as consequences drastic change in water quality, turbidity, and siltation phenomenon	- Erosion prevention mechanisms should be employed as much as possible, including avoid continuing works during heavy rain season	-Number of erosion control equipment installed	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Soil quality degradation will occur due to accumulation of earth excavated materials and their deposit on the adjacent farmlands	- Hydrocarbon residuals deposited on land, and accidental spills should be dealt with as soon as they occur. - Prompt removal of all the affected soil and dumping this in clearly labelled metallic drums with lids for disposal later - All excavated soils shall be reused and remaining selected	-All excavated areas cleaned; -All measurements showed that soil quality and structure remained unchanged; -Site visit report on dumping site done by Environmental Officer	REG-EDCL/Contractor /District /MINAGRI and REMA	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		and transferred to ground indicated by local authority			
	Installation of cable trenches drains, can pose health and safety hazards to both workers and visitors.	- Workers will be provided with necessary protective equipment - -Avoid works nighttime and keep time for works' schedule	-Number of personal protectives equipped delivered to workers -Installation of warning signs on site	REG-EDCL/EPC Contract/District/	costing for PPEs is covered above
	Damages to existing electricity distribution lines and infrastructures during lighting by piping and cabling, which may produce negative impact on local services and nearby families.	- All nearby communities will be informed well in advance to works schedule and any changes which will arise accordingly. - Rapid electricity restoration should be envisaged.	-Program of works' schedule regularly advertised among public services and communities nearby -Number of letters sent or meetings organized with communities	REG-EDCL/EPC contractor and District	no cost is required
	Accumulation of excess construction materials and solid waste (parts of tip or pipe,) during installation of sanitary facilities equipment;	- -Cleaning of all traces of work, removal of the rest of materials, rubble, garbage - -Debris removal of water taps and pipes, cleaning of all sanitary equipment and their u-bend.	-Absence of remaining construction materials visible on the site -Landfill site available and has been monitored	REG-EDCL/OIA and District	To be included in EPC contract's Budget and catered under construction budget
	Risk of high voltage electrocution to residents' people and passengers	- Placement of a metallic fence with iron mesh, properly grounded to protect people from high voltages	-Presence of metallic fence during site visit	REG-EDCL/EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Risks of accidents, injuries and fatalities	- Implementation of occupational health and safety management Plan including training and toolbox talks - Provision of personnel protective equipment (safety shoes, helmets, gloves and visibility shirts)	Presence of safety personnel and training reports Number of PPE provided Number of available first aid Kits	REG-EDCL/EPC contractor/supervisor	20,000(estimated of 200 employees and 100$/person 800 $(one first aid kits for a team of 25People) 5000$ (Lump-Sum for 200

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		- Availability of first aid kit and first aid helper - Health and mideical insurance for the site activities	Proof insurance		workers)
Operations of mounting appropriate equipment	Generation of abnormal vibration levels due to mounting equipment without solid support structure	- Pose of support structure that has sufficient mass and stiffness to permit the machine or equipment to operate in a state of equilibrium.	-Absence of abnormal noise or vibration from mounted equipment	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	Difficult of maintenance operations due to mounting equipment at a highly placed structure	- Utilization of a heavy lifting equipment to an appropriate position for facilitate maintenance - Avoid direct mounting of equipment on concrete or deck plate floors which introduces a resonance problem	-Number of heavy lifting equipment to be utilized -Number of equipment mounted on a solid support structure	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	During equipment installation there shall be risk of electrical shocks and fire outbreaks	- Automatic fire extinguishing system and heavy-duty ABC powder type fire extinguishers shall be available at particularly important electrical equipment areas. - Smoke detectors shall be in all critical areas	-Number of equipment such as smoke detector, extinguishers installed within a substation	REG-EDCL/EPC Contractor/REMA/EO	To be included in EPC contract's Budget and catered under construction budget
Worker's recruitment	Risk of child labour, sexual abuse and increase of HIV	- Recruitment should follow labour low, - Sensitization on HIV and sexual abuse should be conducted	Monitoring report	EPC contractor, EDCL/ nearby health centre)	5,000 (to cater for MoU to be signed with the district hospital to provide sensitizations)
Operational & Maintenance Phase					
Maintenance of electrical principal equipment such as transformers	Unforeseen accidents such as fire outbreak leading to major oil spills of any hazardous materials during routine operations (e.g. transformer	- -Recuperation of oily liquid in a disposed basin and its transfer to a nearby prepared septic pit; - -Regular maintenance and keep a	-Availability of a disposed basin -Constructed septic pit available -Strict calendar of	REMA and District/Sector offices	To be covered Under REG-EDCL operational and line maintenance Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		check on principal equipment	equipment maintenance		
Control of land uses undertaken within the RoW	Risk of localized erosion during rainy season and creation of water pools around pole's feet	- -The ground surface at each poles site will be graded to provide drainage away from the poles and where necessary (e.g. on hillside) terracing, cribbing or riprap may be used to provide protection for poles foundations - -Planting grass cover will protect soil against erosion	-Site visit report to confirm pole foundation design and construction -Number of erosion equipment installed -Superficies of re-vegetated areas	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
The routine clearance of vegetation for maintaining adequate clearance along the route length	Regular clearance of vegetation and loose of its biodiversity Avian collision with power line may occur in big number if localized within migration corridor	- -Restrict clearance for the trees growing under the transmission line or branches overhanging the lines - -Visibility enhancement objects such as marker balls, bird deterrents or diverters shall be installed to avoid avian collision	-Hectares of vegetation cleared or trees' branches cut -Number of marker balls, bird deterrents or diverters installed	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
Maintaining operation and maintenance system	Ensure a better provision efficient operation and maintenance of electrical system in rural zones	- Technical field personnel should report power outages to the REG-EDCL and repair faults quickly - Public education to raise awareness of electricity danger and how to utilize the system safely - Improve supervision of field workers and conduct system maintenance regularly and diligently	-Monthly reports on power outages and faults repaired -Number of workshops organized or awareness meetings hold -Number of supervision missions to workers	REG-EDCL District and Sectors	To be covered Under REG-EDCL operational and line maintenance Budget
Total budget					**70,300**

Annex 5: Environmental Management Plan (EMP) for Burera District

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
Pre-construction phase					
Survey of lines routes	Loss of trees and vegetation	- To follow standards and REG-EDCL procedures and practices in selection of the electrical line route in rural zones - Avoid areas with a lot of offs trees and crops	-Report on REG-EDCL clearance process based on Environmental Officer's field report Final line routes designs	REG-EDCL/EPC contractor, REMA, District	To be included in EPC contract's Budget
	Loss crops trees and perennial crops	- Valuation and compensation of affected assets	Compensation report	EDCL-MINIECOFIN	cost to be covered in A-RAP
	PAPs complaints about their assets affected by survey team	- Establishment and operationalisation of GRM - Only clear areas earmarked only for the line route	Survey report	EDCL-EPC Contractor	17,000 (Estimated amount for meetings and transport allowance for members of committees-in 17 sectors making the project area)
Implementation of the project	No compliance in terms of environmental and social safeguards	- Recruitment of an Environmental safeguard and a Social Safeguard Officers	Employed environmental and Social Safeguard officers	REG-EDCL/ project funder	1,300*12months=15,000 (650 USD monthly salary for each Officer
Construction Phase					
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of biodiversity (e.g. trees, crops) due to alteration of the natural habitats, visual and auditory disturbance and damages due to the presence of equipment and workers	- To ensure that only those trees and other cover vegetation marked by the technical staff are cleared - Be informed about REG-EDCL procedures and practices in clearing sites and follow standards	-Number of trees felled and superficies of areas cleared for vegetation removal. -Report from EO observations on field -Report from DM&E of REG-EDCL	REG-EDCL/ /District REG-EDCL/ Contractor, REMA, District	To be included in EPC contract's Budget
	Impacting the ecological sensitive areas or wetlands through vegetation clearing	- Exploring the possibility of planting lower growing vegetation under below poles or reforestation nearby the power line corridor to	Availability of REG-EDCL procedure and practices document -Superficies of re-	REG-EDCL/EPC Contractor and District	PAPs contribution

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		restore natural habitats. - The choice of power lines route considered avoiding very sensitive and wetlands rich in biodiversity	vegetated areas -Report from site observations by EO -Power line route map		
	Risk of firing forests and natural habitats if cut trees and vegetation will be burnt	- Leave cut materials to rot down in situ and do not burn; - Leave a covering of grass and other lower vegetation on site - Sensitization on effected off bush fire	-Number of violations or illegal report	REG-EDCL/EPC Contractor and District	No budget is required
Clearing and excavation of Poles base and foundation;	Loose of natural vegetation and its biodiversity	- Protection of excavated soil materials from erosion and contamination by placing them away from stream of water on the slop or in direct line of local drainage.	-Reports on sites observations relatives to all practices recommended	REG-EDCL/OIA and Districts	To be included in EPC contract's Budget and catered under construction budget
	Alteration of soil structure as well as exposure of soil to erosion.	- Loose soil should be kept covered till the time of backfill and excess soil removed and transferred to a dumping site	Monitoring report "	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	Loose soil and construction materials will lead to damages of crops and soil contamination	- -Construction materials shall be storage within the footprint of the site to avoid any kind of damage and contamination of soil/crop adjoining	Monitoring report	EPC contractor	To be included in EPC contract's Budget and catered under construction budget
	If excavation will occur in swampy areas, water pumped would further increase erosion from surface runoff	- -Movement of materials and manpower shall be restricted to existing tracks to avoid creation of new ways	Monitoring report	EPC contractor	No budget required
Spotting plus erection of Poles & Conductors	Vegetation/crops in landing area could also be extensively damaged	- -Minimum clearing of trees and wherever possible trimming of trees will be adopted instead of felling them	-Number of trees felled or trimmed	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	Working at heights could present hazards to climbers and risks of falling objects on ground workers	- Protective measures should be ensured to workers including individual protective equipment	-Number of protective equipment provided to workers - Accident reports	EPC Contractor	7,500 (estimated 5 workers working at heigh with appropriate PPE costing 1,500 USD each)
	Working with cranes and other lifting equipment also present potential injury from broken wires, lifting tackle and swinging objects.	- First aid box and emergency medical coverage will be provided to workers.	-Report on cases of medical care provided to workers	EPC Contractor	Cost covered under risks of accidents, injuries and fatalities
	Stringing of lines can cause major traffic blockage where roads are crossed and/or create impacts on occupational health and safety	- At road crossing during stringing, the conductors will be elevated with the help of poles on either side of the road, to avoid any blockage to traffic	Report on sites observations relative to such practices	EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
Construction of poles base foundation	Collection of storm water leading to the creation of stagnant pools at the pole's bases	- -The ground surface of the pole sites shall be so graded as to gently provide water drainage away from the pole legs;	-Site visit report to confirm pole foundation design and construction	REG-EDCL/EPC Contractor and District	To be included in EPC contract's Budget and catered under construction budget
Deliverance and mounting of appropriate strength electric equipment	Fall and trip hazards for workers and passersby during mounting of strength electric equipment Risk of poles failure resulting in societal hazards Stringing activity around low- or high-tension wires and other electrical units could be a potential hazard	- Reduce risks to workers and general public during erection of poles and mounting strength electrical equipment by putting warning signs (danger sign board) - -To ensure that safety margin is included in the design of poles to minimize the risk from any seismic activity or severe storm conditions	-Presence of warning signs or danger sign board visible -Report on verification of ordered poles or commands	REG-EDCL/ Contractor and District REG-EDCL/ Contractor and District	To be included in EPC contract's Budget and catered under construction budget "
Use of heavy lifting equipment to position the plant followed by wiring and connection	Risk of accidents during lifting equipment to position, erection of poles, stringing and wiring as well as connection	- -All vehicles containing heavy lifting equipment will be instructed to follow traffic norms strictly; - Ensure all` safety measures to workers and public including provision of protective safety equipment specific to works;	-Availability of traffic norms and report on its application -Number of protective equipment provided to workers -Report on cases of	REG-EDCL/Contractor and District	No cost required. The cost of first aid kit covered above

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		- First aid box and emergency medical coverage will be provided to workers.	medical care provided to workers		
Works for laying foundation, erection of poles, stringing time etc..	Transport of construction materials across agricultural fields, pose of conductors from pole to the next, all will lead damages to standing crops	- -Adequate compensation will need to be paid whose land/productivity is affected - Consultation and communication with affected persons landowners	-Minutes on the consultation and negotiation meeting with project affected persons (PAPs) -Report on payment and proof documents	REG-EDCL and District	Cost for compensation to be covered under A-RAP
Lines constructions	Clearing all vegetation, felling trees and crops plus removal of roots	- Reforestation nearby the power line corridor in order to restore natural habitats	-Number of trees planted -Superficies of re-vegetated areas	REG-EDCL/OIA and District	To be covered under District ordinary Budget related to reforestation and environmental management
	Air pollution by gaseous like SO2, NOx, and CO to site peripheries exhausted from vehicles and machineries will lead to various chest and respiratory tract infections of human and animals	- Heavy machinery and vehicles regular inspected to reduce at minimal exhaust - Workers shall be equipped with personal protective materials	-Report on monthly inspection of vehicles -Number of personal protective equipment delivered to workers	REG-EDCL/EPC contractor and District	8,000 (estimated 200 workers with overall PPE costing 40 USD each)
	Incremental of stockpiled metal waste, concrete, earth and stones from demolished infrastructures	- All un-reused solid waste will be transferred to the dumping site selected and indicated by local administrative authority	-Report on the existence of dumping place -Site visit, all utilized areas are cleaned	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Scraping off unwanted topsoil layers will lead to soil loss washed to lowland area or to streams and rivers having as consequences drastic change in water quality, turbidity, and siltation phenomenon	- Erosion prevention mechanisms should be employed as much as possible, including avoid continuing works during heavy rain season	-Number of erosion control equipment installed	REG-EDCL/EPC contractor and District	To be included in EPC contract's Budget and catered under construction budget
	Soil quality degradation will occur due to accumulation of earth	- Hydrocarbon residuals deposited on land, and accidental spills	-All excavated areas cleaned;	REG-EDCL/Contractor /District /MINAGRI and	To be included in EPC contract's Budget and catered

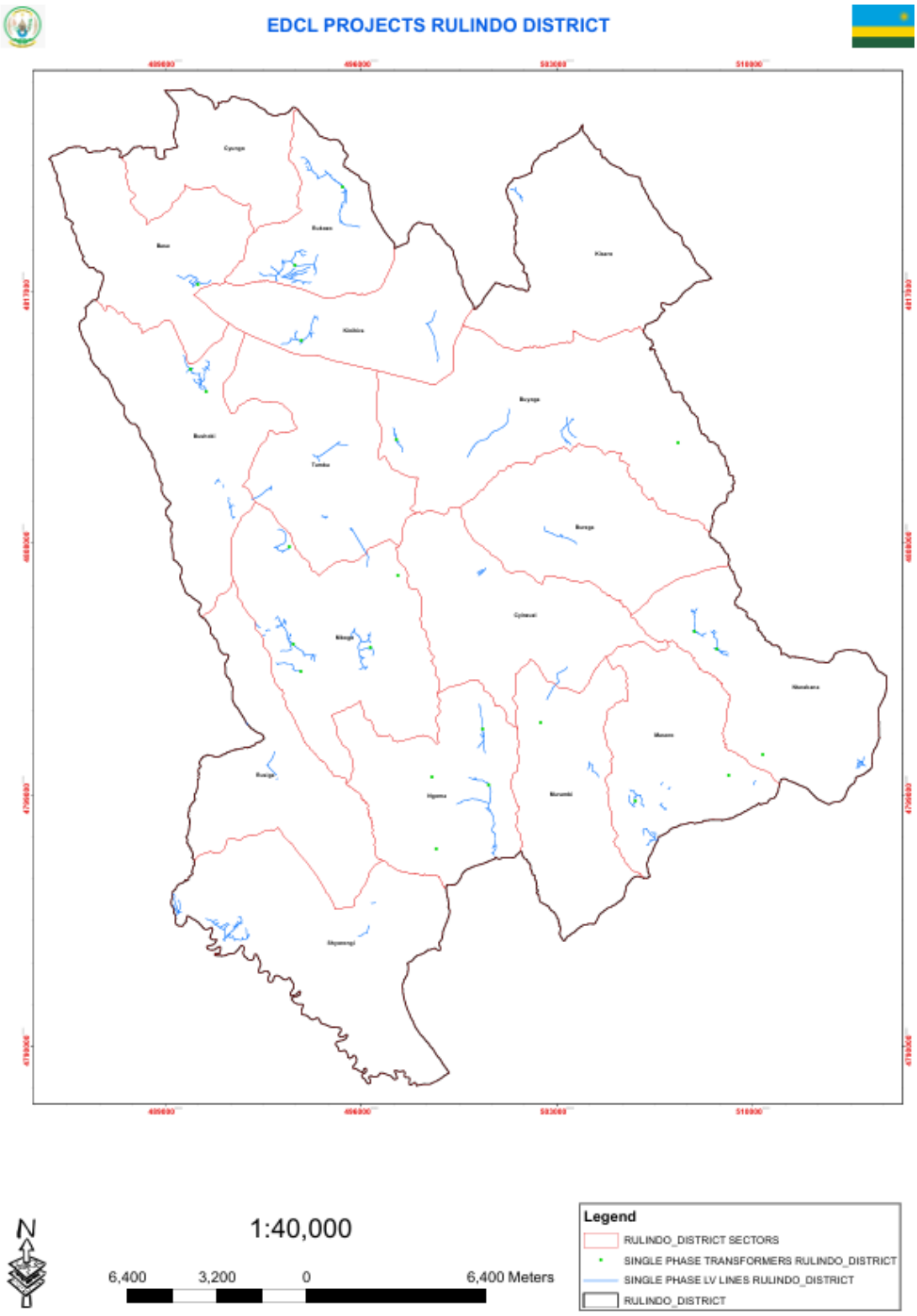
Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	excavated materials and their deposit on the adjacent farmlands	should be dealt with as soon as they occur. - Prompt removal of all the affected soil and dumping this in clearly labelled metallic drums with lids for disposal later - All excavated soils shall be reused and remaining selected and transferred to ground indicated by local authority	-All measurements showed that soil quality and structure remained unchanged; -Site visit report on dumping site done by Environmental Officer	REMA	under construction budget
	Installation of cable trenches drains, can pose health and safety hazards to both workers and visitors.	- Workers will be provided with necessary protective equipment - -Avoid works nighttime and keep time for works' schedule	-Number of personal protectives equipped delivered to workers -Installation of warning signs on site	REG-EDCL/EPC Contractor/ District/	Costing for PPEs is covered above
	Damages to existing electricity distribution lines and infrastructures during lighting by piping and cabling, which may produce negative impact on local services and nearby families.	- All nearby communities will be informed well in advance to works schedule and any changes which will arise accordingly. - Rapid electricity restoration should be envisaged.	-Program of works' schedule regularly advertised among public services and communities nearby -Number of letters sent or meetings organized with communities	REG-EDCL/EPC contractor and District	no cost is required
	Accumulation of excess construction materials and solid waste (parts of tip or pipe,) during installation of sanitary facilities equipment;	- -Cleaning of all traces of work, removal of the rest of materials, rubble, garbage - -Debris removal of water taps and pipes, cleaning of all sanitary equipment and their u-bend.	-Absence of remaining construction materials visible on the site -Landfill site available and has been monitored	REG-EDCL/OIA and Districts	To be included in EPC contract's Budget and catered under construction budget
	Risk of high voltage electrocution to residents' people and	- Placement of a metallic fence with iron mesh, properly grounded to	-Presence of metallic fence during site visit	REG-EDCL/EPC contractor	To be included in EPC contract's Budget and catered

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
	passengers	protect people from high voltages			under construction budget
	Risks of accidents, injuries and fatalities	- Implementation of occupational health and safety management Plan including training and toolbox talks - Provision of personnel protective equipment (safety shoes, helmets, gloves and visibility shirts) - Availability of first aid kit and first aid helper - Health and medical insurance for the site activities	Presence of safety personnel and training reports Number of PPE provided Number of available first aid Kits Proof insurance	REG-EDCL/EPC contractor/supervisor	20,000 (estimated of 200 employees and 100$/person 800 $(one first aid kits for a team of 25People) 5000$ (Lump-Sum for 200 workers)
Operations of mounting appropriate equipment	Generation of abnormal vibration levels due to mounting equipment without solid support structure	- Pose of support structure that has sufficient mass and stiffness to permit the machine or equipment to operate in a state of equilibrium.	-Absence of abnormal noise or vibration from mounted equipment	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	Difficult of maintenance operations due to mounting equipment at a highly placed structure	- Utilization of a heavy lifting equipment to an appropriate position for facilitate maintenance - Avoid direct mounting of equipment on concrete or deck plate floors which introduces a resonance problem	-Number of heavy lifting equipment to be utilized -Number of equipment mounted on a solid support structure	REG-EDCL/EPC Contractor	To be included in EPC contract's Budget and catered under construction budget
	During equipment installation there shall be risk of electrical shocks and fire outbreaks	- Automatic fire extinguishing system and heavy-duty ABC powder type fire extinguishers shall be available at particularly important electrical equipment areas. - Smoke detectors shall be in all critical areas	-Number of equipment such as smoke detector, extinguishers installed within a substation	REG-EDCL/EPC Contractor/ REMA/EO	To be included in EPC contract's Budget and catered under construction budget
Worker's recruitment	Risk of child labour, sexual abuse and increase of HIV	- Recruitment should follow labour low,	Monitoring report	EPC contractor, EDCL/ nearby health centre)	5,000 (to cater for MoU to be signed with the district hospital

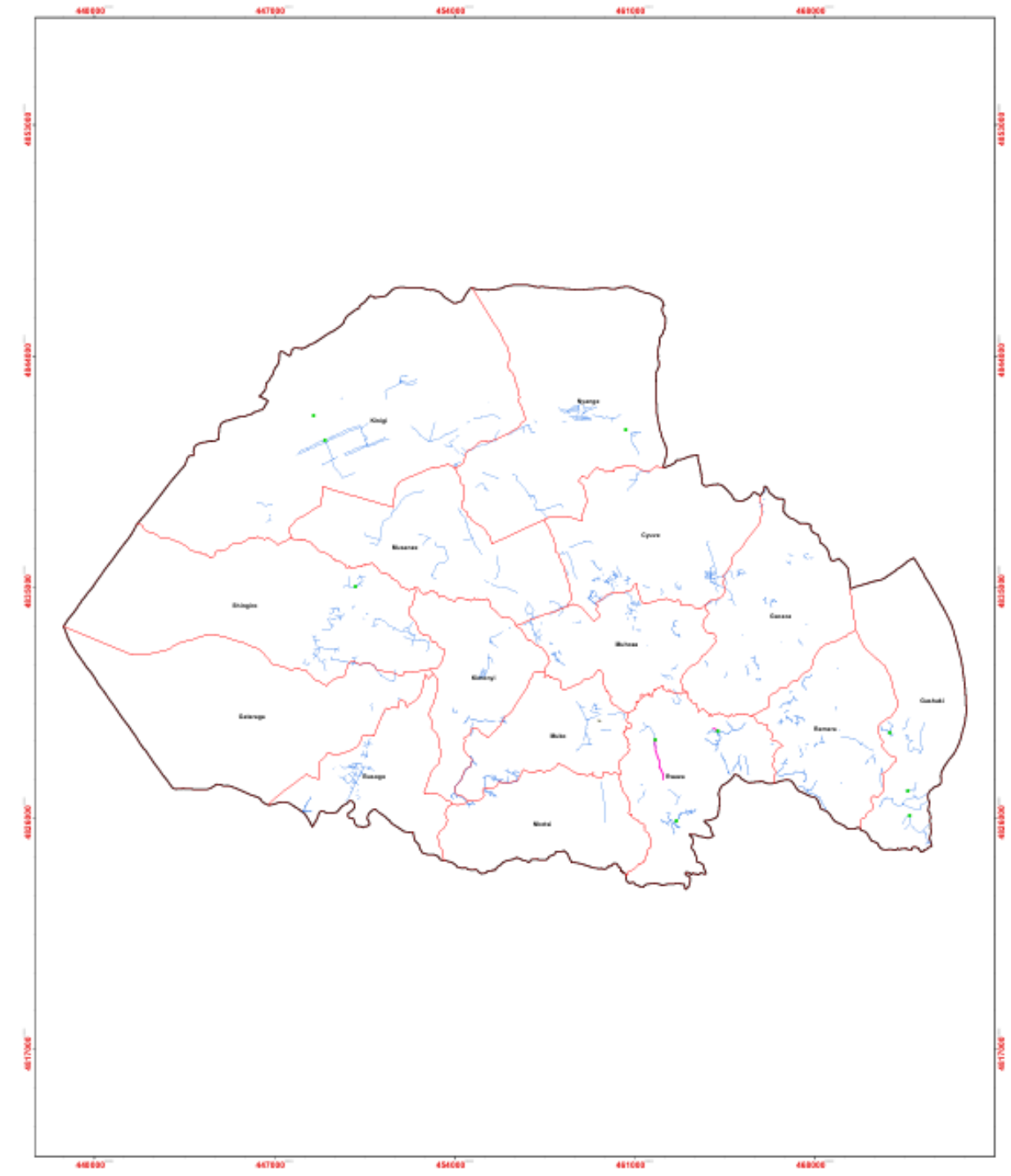
Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		- Sensitization on HIV and sexual abuse should be conducted			to provide sensitizations)
Operational & Maintenance Phase					
Maintenance of electrical principal equipment such as transformers	Unforeseen accidents such as fire outbreak leading to major oil spills of any hazardous materials during routine operations (e.g. transformer	- -Recuperation of oily liquid in a disposed basin and its transfer to a nearby prepared septic pit; - -Regular maintenance and keep a check on principal equipment	-Availability of a disposed basin -Constructed septic pit available -Strict calendar of equipment maintenance	REMA and District/Sector offices	To be covered Under REG-EDCL operational and line maintenance Budget
Control of land uses undertaken within the RoW	Risk of localized erosion during rainy season and creation of water pools around pole's feet	- -The ground surface at each poles site will be graded to provide drainage away from the poles and where necessary (e.g. on hillside) terracing, cribbing or riprap may be used to provide protection for poles foundations - -Planting grass cover will protect soil against erosion	-Site visit report to confirm pole foundation design and construction -Number of erosion equipment installed -Superficies of re-vegetated areas	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
The routine clearance of vegetation for maintaining adequate clearance along the route length	Regular clearance of vegetation and loose of its biodiversity Avian collision with power line may occur in big number if localized within migration corridor	- -Restrict clearance for the trees growing under the transmission line or branches overhanging the lines - -Visibility enhancement objects such as marker balls, bird deterrents or diverters shall be installed to avoid avian collision	-Hectares of vegetation cleared or trees' branches cut -Number of marker balls, bird deterrents or diverters installed	REG-EDCL/Contractor and District	To be covered Under REG-EDCL operational and line maintenance Budget
Maintaining operation and maintenance system	Ensure a better provision efficient operation and maintenance of electrical system in rural zones	- Technical field personnel should report power outages to the REG-EDCL and repair faults quickly - Public education to raise awareness of electricity danger and how to utilize the system safely	-Monthly reports on power outages and faults repaired -Number of workshops organized or awareness meetings hold	REG-EDCL District and Sectors	To be covered Under REG-EDCL operational and line maintenance Budget

Activities	Description of Potential Impacts	Mitigations measures	Monitoring indicators	Responsible parties for monitoring	Budget (USD)
		- Improve supervision of field workers and conduct system maintenance regularly and diligently	-Number of supervision missions to workers		
Total budget					**78,300**

Annex 6: Maps of the project location



EDCL PROJECTS MUSANZE DISTRICT



Legend

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- MUSANZE_DISTRICT_CABINE2
- MUSANZE_DISTRICT_CABINES
- SINGLE PHASE TRANSFORMERS MUSANZE_DISTRICT
- SINGLE PHASE MV LINES MUSANZE_DISTRICT
- SINGLE PHASE LV LINES MUSANZE_DISTRICT
- MUSANZE_DISTRICT

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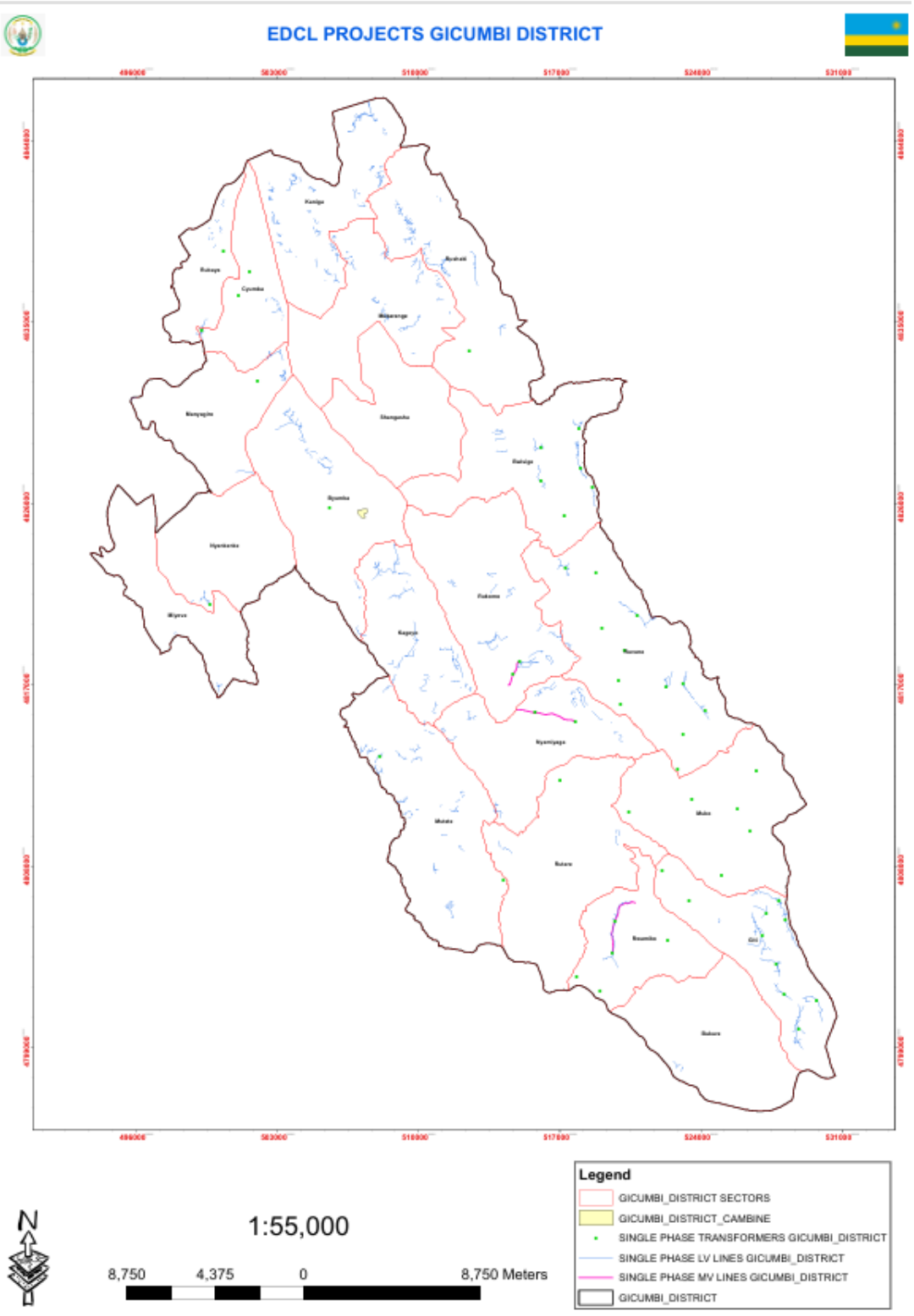
7,600 3,800 0 7,600 Meters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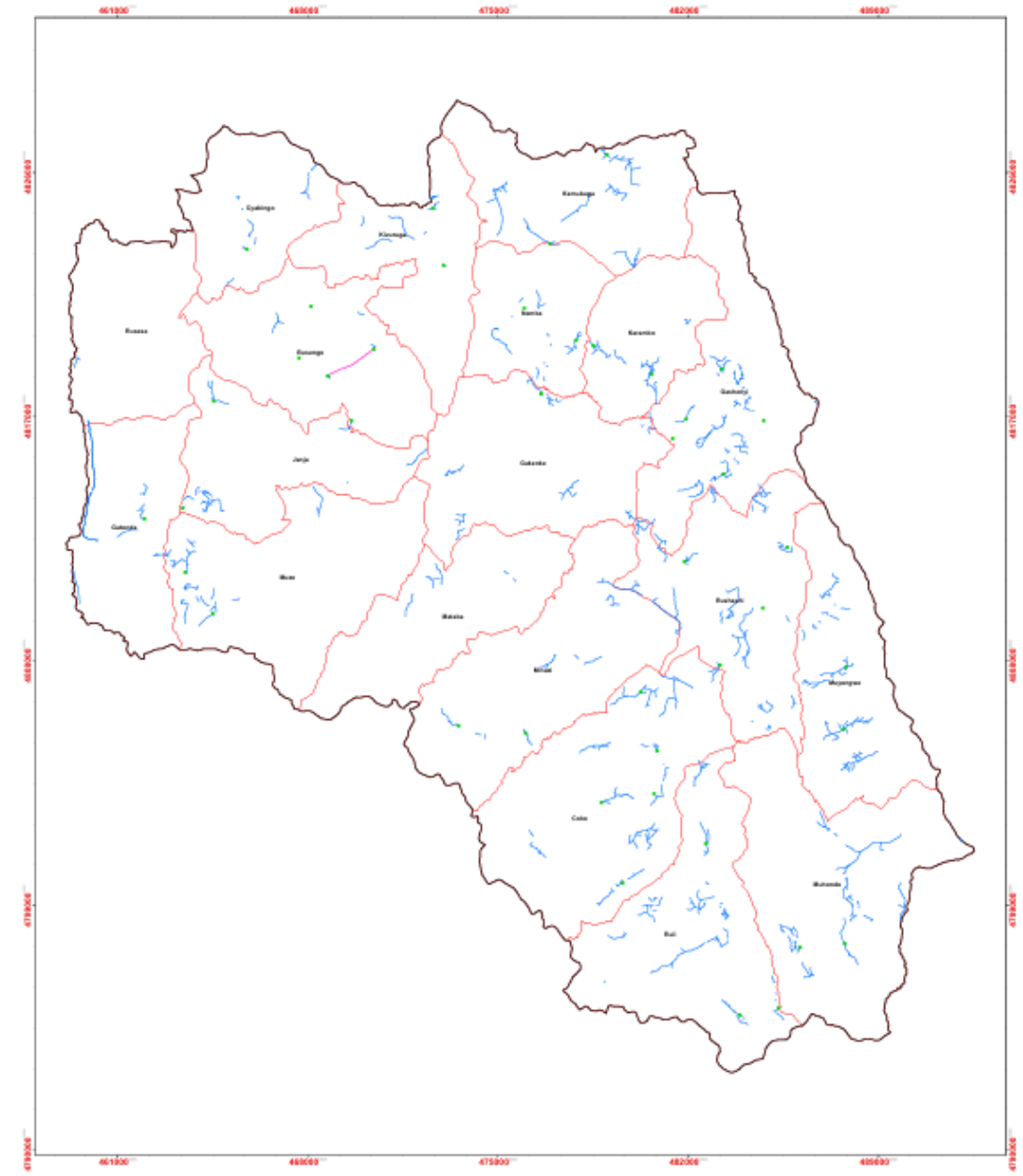

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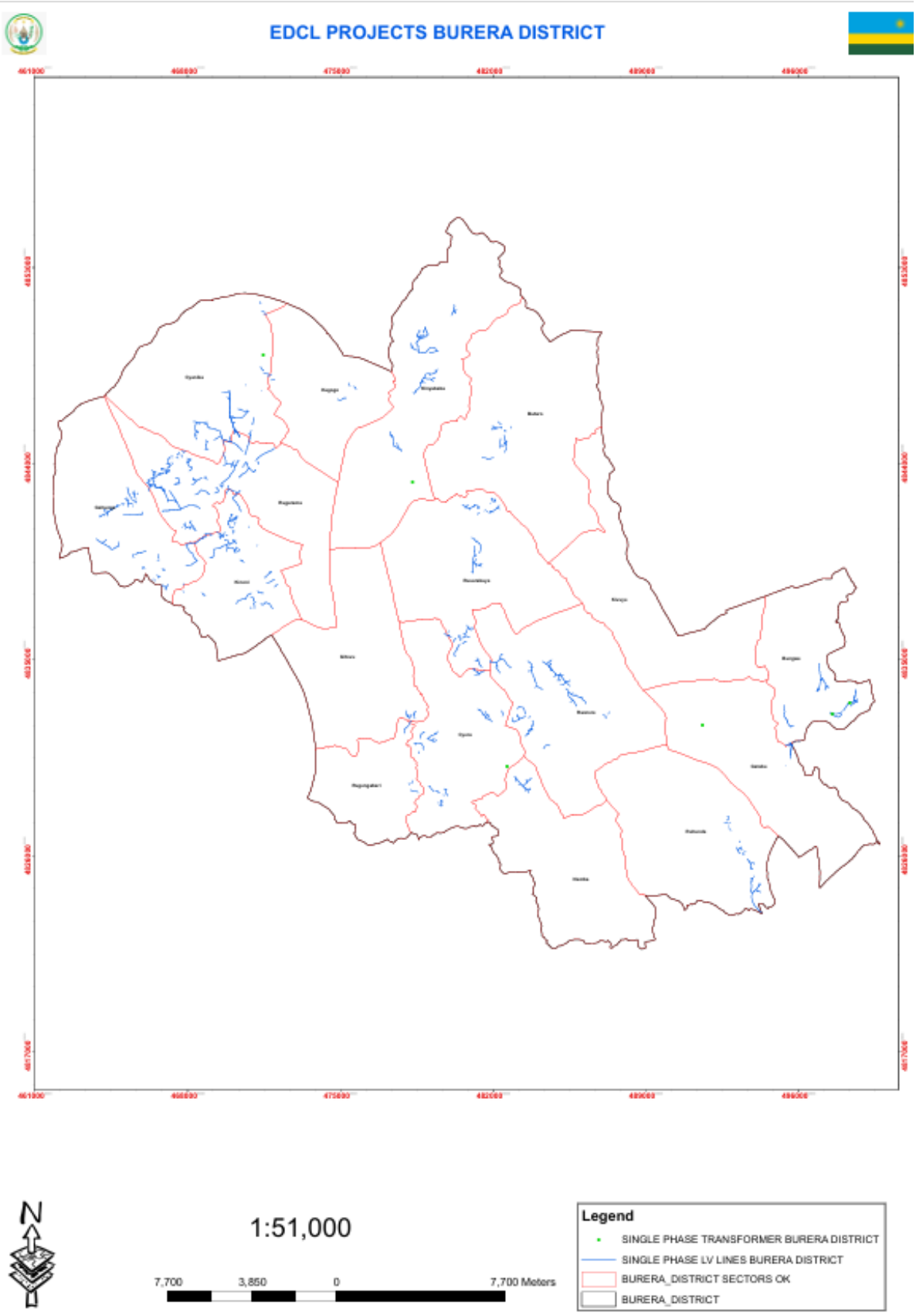
- GAKENKE_DISTRICT



Annex 7: Guidelines of the Right of Way for electrical power lines

Guidelines_on_Right-Of-Way_for_Pow

Annex 8: List of contacted persons

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
1	TURIKUMANA ENOCH	GAKENKE	KIVURUGA	PGE RPF	0783022432	[illegible]
2	KWITONDA FRANCINE	Gakenke	Kivuruga	Umuturage	07 —	[illegible]
3	NGENDAHAYO SAMWEL	Gakenke	Kivuruga	Umuturage	0791375112	[illegible]
4	MUNYANEZA LEONARD	Gakenke	Kivuruga	Umuturage	—	[illegible]
5	J. Pierre Ntabimana	Musanze	Cyuve	Umuturage	0786787129	[illegible]
6.	Ntibankundiye Alexi	Musanze	Cyuve	Umuturage	0783219501	[illegible]
7.	Emmanuel Munyeshuri	Musanze	Gacaca	Umuturage	0788699563	[illegible]
8.	Theogene Ndagijimana	Musanze	Gacaca	Umuturage	0 —	[illegible]
9	J. Paul Ntirenganya	Musanze	Gacaca	Umuturage	0782031500	[illegible]
10.	Patrick Niyokwizera	Musanze	Gacaca	Umuturage	0726192216	[illegible]
11.	Speciose Nyirabagenzi	Musanze	Cyuve	Umuturage	—	[illegible]
12.	Marthe Mukeshimana	Musanze	Cyuve	Umuturage	0780922903	[illegible]
13.	Augustin Hakizimana	Musanze	Cyuve	Mujyanama	0784920491	[illegible]
14.	Domitila Ntawiheba	Musanze	Cyuve	Umurimyi	—	[illegible]
15.	Felicien Uwimana	Musanze	Cyuve	Umuturage	0785401956	[illegible]
16.	Constance Nyirabahizi	Musanze	Cyuve	Umuturage	—	[illegible]
17.	Bosco Manirabona	Musanze	Gacaca	Umuturage	0781403536	[illegible]
18.	Gafford Mategeko	Musanze	Cyuve	Umuturage	0786870945	[illegible]
19.	J. D'Amour Niyonteze	Musanze	Gacaca	Umuturage	0782008211	[illegible]
20.	Bernacille Nsabimana	Musanze	Gacaca	Umuturage	—	[illegible]
21.	Nyiransabimana Caritas	Musanze	Cyuve	Umuturage	0787613538	[illegible]

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
1	Musabyemariya Clementine	Rulindo	MBOGO	SEDO / Bukoro	0785410627	[illegible]
2.	Nyiraneza Denise	Rulindo	Mbogo	Umuturage	0782995435	[illegible]
3	Uwineza M. Chantal	Rulindo	Mbogo	Umuturage	0726555020	[illegible]
4	Hakuzimana Alphonsine	Rulindo	Mbogo	Umuturage	0723914985	[illegible]
5	Nzarama Patrice	Rulindo	Mbogo	Bukoro	0723787229	
6	Uwayezu Daphrose	Rulindo	Mbogo	Bukoro	0780472395	[illegible]
7.	MUSABYIMANA Speciose	Rulindo	Mbogo	BUKORO	0781710827	[illegible]
8	HAKIMANIZANYE Jenetrude	Rulindo	Mbogo	BUKORO	0724675597	[illegible]
9.	M. Uwamariya Vestine	Rulindo	Mbogo	BUKORO	079802259	[illegible]
10	Nyirambarushimana Agnes	Rulindo	Mbogo	BUKORO	0781568069	[illegible]
11	HAKIZIMANA Fidele	Rulindo	Mbogo	BUKORO		[illegible]
12	Nyiramafubo Seraphine	Rulindo	Mbogo	BUKORO	0792081460	[illegible]
13	Mukeshimana Neyo	Rulindo	Mbogo	BUKORO	0737578736	[illegible]
14	Mukamusoni Tarisisia	Rulindo	Mbogo	BUKORO		[illegible]
15	NKURIKIYIMANA ISAC	Rulindo	Mbogo	Umuturage	—	[illegible]

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
01	NTIRENGANJA Epimaque	Gakenke	Busengo	[illegible] Maintenance	0788764005	
02	MUDACUMURA Bazi Nottor	Gakenke	Gakenke	DIPME	0788940488	
03	HAKIZIMANA Olivet	Gakenke	Gakenke	Technical Supervisor	0788472411	
04	NKOMAYOMBI J. de Dieu	GAKENKE	GAKENKE	MOB secretary	0783616291	
5	MUGWANEZA VESTINE	Gakenke	Kivuruga	Umuturage	0785227929	
6	IYAMUREMYE ADRIEN	Gakenke	Kivuruga	Umuturage	0783155517	
7	NDUWAYEZU FAUSTIN	Gakenke	Busengo	Umuturage	0783307065	
8	NDENZAYO PASCAL	Gakenke	Busengo	Umuturage	0785574392	
9	HAKIZIMANA Vianney	Gakenke	Busengo	Umuturage	0783790054	
10.	Theogene Hategekimana	Kivuruga	Busengo	Umuturage	0783114006	
11.	Ntezimana J Baptiste	Kivuruga	Busengo	Umuturage	0789644078	
12.	OSCAR Nyirabaruta	Gakenke	Gakenke	Umuturage	0799348464	
13.	Theoneste Kamali	Gakenke	Gakenke	Umuturage	0784006899	
14.	Nyirabakiro Theoneste	Gakenke	Gakenke	Umuturage	0785233587	
15	Francois Uzabakiriho	Gakenke	Gakenke	Umuturage	0784743390	
16.	Johan Hategimana	Gakenke	Busengo	Umuturage	0786225530	

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
1	MUHAYIMANA Celestin	Rulindo	Bushoki	Branch Manager	0788797778	
2	HABIYAMBA Janvier	RULindo	Bushoki	Technical Supervisor	0783251461	
3.	Eng Emile NTAMBARA	Rulindo	Bushoki	Director Dsc. Ge	0788480641	
4.	BIZIMANA Jean Claude	Rulindo	Bushoki	Electricity Engineer	0788435307	
5	Tuyisenge Theresie	Rulindo	Bushoki	umuturage	0791138428	
6	Uwizeyimana Agnes	Rulindo	Bukoro	Umuturage	0780926301	
7	Muhawenimana Nadia	Rurindo	Bukoro	Umuturage	0729090065	
8	Cyendamgabo Erneste	Rurindo	Bukoro	umuturage	0789081982	
9	Akayezu Theodozia	Rurindo	Bukoro	Umuturage	0784862595	
14	Hakandamuage Justine	Rurindo	Bukoro	umuturage	0785436966	
15	NIYOMUKIZA Clarice	Rurindo	Bushoki	Umuturage	0791819277	
16	MUTAWABEGA Laurence	Rurindo	Bushoki	Umuturage	0788327275	
17	Mutu jimana	Rurindo	Bushoki	Umuturage	0791819608	
18	Mukeshimana EUGENIE	Rulindo	Bushoki	Umuturage	0783613036	
19	Uwanyapasani Jerard	Rulindo	Bushoki	umuturage	0727085269	
20	Marabyimana ja Vestine	Rulindo	Bukoro	Umuturage	0728611785	
21	MYisabahimana Vestine	Rulindo	Bukoro	umuturage	0729566688	
21	UKIMARIYA M. Mediatrice	Rulindo	Bukoro	umuturage	0722393107	
22	KAbahimbi Frenesite	Rulindo	Bukoro	Umuturage	—	

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
01	Kambanda Paulin	Musanze	Cyuve	Technical Supervisor	0788747414	[illegible]
02	NIZEYIMANA Etienne	MUSANZE	MUSANZE	Director of Ofc	0788F2691	[illegible]
03	HAKIZAVEZU Alphonse	MUSANZE	MUSANZE	Electricity Maint. Eng	07856/8605	[illegible]
4	NIYONSABA FELICIEN	MUSANZE	MUCYANZE	Umuturage	07 —	[illegible]
5	UWIZEYIMANA JOURIENNE	MUSANZE	Musanze	umuturage	0790989036	[illegible]
6	IMANIZABAYO OBED	MUSANZE	MUSANZE	Umuturage	0723764619	[illegible]
7	MUKAMUGANGA BEATRICE	MUSANZE	Cyuve	Umuturage	0785637115	[illegible]
8	BIZIMANA GABRIEL	MUSANZE	Cyuve	Umuturage	—	[illegible]
9	MANIRAGABA EMMANUEL	MUSANZE	Cyuve	Umuturage	078[illegible]70703	[illegible]
10	UZAMUKUNDA MARIE ROSE	MUSANZE	Cyuve	Umuturage	0788818700	[illegible]
11	BIZIMANA FELICIEN	MUSANZE	Cyuve	Umuturage	—	[illegible]
12	KARIMANZYA ATHANASE	MUSANZE	Gacaca	Umuturage	—	[illegible]
13	NYITURIKI CONSOLE	MUSANZE	Gacaca	Umuturage	0780752571	[illegible]
14	NYIRABATURANYI ESPERANCE	MUSANZE	Gacaca	Umuturage	0784670282	[illegible]
15	SEMITIATANO CHARLES	MUSANZE	Gacaca	Umuturage	0786997533	[illegible]
16	MUNYANEZA ALPHONSE	MUSANZE	Gacaca	Umuturage	0783840061	[illegible]
17	NIKEMBERE Jauvic	MUSANZE	CYUVE	TECHNICIEN	0782710596	[illegible]
18	MUNYAMABUKA FELICIEN	MUSANZE	Cyuve	Umuturage	—	[illegible]
19	NIYOMUKIZA ERIC	MUSANZE	Cyuve	Umuturage	078412o193	[illegible]
20	NDACYAYISENGA FERICIEN	MUSANZE	Cyuve	Umuturage	0789254244	[illegible]
21	HAKIZIMANA J. BOSCO	MUSANZE	Cyuve	Umuturage	0783325660	[illegible]

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
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2	NTAGITIMANA Pascal	Burera	Butaro	Branch Techn Supervisor	078684417o	[illegible]
3	IZABAYO François	Burera	BUTARO	BF Director	078[illegible]25	[illegible]
4	SIBOMANA BONIFACE	BURERA	RUSARABUYE	Umuturage	0795601750	[illegible]
5	NDIMUBANZI AUGUSTIN	BURERA	BUTARO	Umuturage	0788654460	[illegible]
6	HAMENYAMUNGU ILDEFONSE	BURERA	BUTARO	umuturage	078[illegible]0029	[illegible]
7	MUKARUGWIRE ALFONSINE	BURERA	BUTARO	umuturage	0782765178	[illegible]
8	UWIRANGIYE ALBERTINE	BURERA	RUSARABUYE	Umuturage	0787003172	[illegible]
9	NDAYAMBAJE J. DE La Paix	BURERA	RUSARABUYE	Umuturage	0786133952	[illegible]
10	NDUWAMUNGU NIKODEMU	BURERA	RUSARABUYE	Umuturage	0782465852	[illegible]
11	HAVUGIMANA KEVIN	BURERA	RUSARABUYE	Umuturage	0787889988	[illegible]
12	BYIRINGIRO YVES	BURERA	RUSARABUYE	Umuturage	0787608546	[illegible]
13	HAVUGIMANA J. BOSCO	BURERA	RUSARABUYE	Umuturage	0790924509	[illegible]
14	NSANZUMUHIRE GILBERT	BURERA	RUSARABUYE	Umuturage	0785383473	[illegible]
15	RUBERANZIKO EDISO	BURERA	RUSARABUYE	Umuturage	0786718138	[illegible]
16	IYAMUYOPAYE EZECHIEL	BURERA	RUSARABUYE	Umuturage	0780370188	[illegible]
17	NTAKIRUTIMANA LOUISE	BURERA	RUSARABUYE	Umuturage	0787273715	[illegible]
18	YAMBABORIYE BEATRICE	BURERA	Cyeru	Umuturage	0781567259	[illegible]
19	UMUKERWA VALENTINE	BURERA	Cyeru	Umuturage	0782531989	[illegible]
20	BIHOYIKI MARIE GORETTE	BURERA	Cyeru	Umuturage	0787755500	[illegible]
		BURERA	Cyeru	Umuturage		

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
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2.	Rutaboyufura Jean de Dieu	Gicumbi	Byumba	Tech.Supervisor	0787773134	
3-	J.Baptiste - Nshimiyimana	Gicumbi	Nyamiyaga	- Umuhinzi	0784238385	
4	J.Bosco Twahirwa	Gicumbi	" "	Umuhinzi	0787918073	
5.	J.Bosco Mbarushimana	Gicumbi	Nyamiyaga	Umuhinzi	0738112683	
6.	Elie Nsengiyumva	Gicumbi	Nyamiyaga	Umuhinzi	0789733736	
7	Natasha Modeste	Gicumbi	Nyamiyaga	Umuhinzi	0788333294	
8-	Mubirwa J.P. Pierre	Gicumbi	Nyamiyaga	Umuhinzi	0793607931	
9.	J.D'Amour Habarugira	Gicumbi	Nyamiyaga	Umuhinzi	0784125109	
10	Joseph Hakizimana	Gicumbi	Nyamiyaga	Umucuruzi	0783507894	
11.	MUKAMANA Sandrine	GICUMBI	Rukomo	SLM	0781497943	
12.	HAGABIMANA [illegible]	GICUMBI	Rukomo	AOS/ TH	0784712640	

consulted Stakeholders during Onsite investigation of EPCs (Northern province)

No	Names	District	Sector	Position	Telephone	Signature
1	Protogene Niyibizi	Burera	Rusarabuye		0785383515	
2.	Nyirahabimana Gloriose				0785677813	
3.	MURAGIJIMANA Laurence	Burera	Rusarabuye	umuturage	0781217454	
4.	Uwimana Nadine	Burera	Rusarabuye	–	0781863011	
5	Flaraille MPUMURO	Burera	Butaro	Electrician	0781402845	
6	UWITONZE THEOPHILE	Rulindo	MBOGO	UBUHINZI	0783996900	
7	MUKANGANGO BERNADETTE	Rulindo	Mbogo	Ubuhinzi	0795290807	
8	UMUHOZA EMERANCE	Rulindo	Mbogo	Ubuhinzi	0782339358	
9	GASHIRABAKE CECILE	Rulindo	Mbogo	Ubuhinzi	0787741150	
10	NSENGIYUMVA THEOGENE	Rulindo	Mbogo	Umuturage	0 —	
11	MUHANEZA SERAPHINE	Rulindo	Mbogo	Umuturage	0 —	
12	MUJAWAMARIYA PASCASIE	Rulindo	Mbogo	Umuturage	0784316156	
13	MUKAMANA PRUDENCE	Rulindo	Mbogo	Umuturage	0784213954	
14	MUKAMANA SERAPHINE	Rulindo	Mbogo	Umuturage	—	
15	ABIZERIMANA ELIVINE	Rulindo	Mbogo	Umuturage	0787081843	
16	MUREKAMBANZE FAUSTIN	Rulindo	Mbogo	Umuturage	0788375703	
17	MUHAWENIMANA LEONIDE	Rulindo	Mbogo	Umuturage	0788813259	
18	ANAGARATIEN MUKANYISIRE	Rulindo	Mbogo	Umuturage.	—	
19	HAKIZIMANA Eric	Rulindo	Mbogo	Technician	0780897845	

Annex 9: Grievance Management Mechanism

The experience has shown that many grievances derive from misunderstandings of the Project Policy, or result from neighbour 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:

i. Registration of the complaint, grievance, or dispute case by REG-EDCL in collaboration with local authorities;
ii. Processing of the grievance or dispute until closure is established (within 15 days) based on evidence that acceptable action was taken by EDCL; and
iii. In the event where the complainant is not satisfied with action taken by REG-EDCL because 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-EDCL 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, EDCL 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-EDCL 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 30: 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; ✓ 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.

Annex 10: Physical Cultural Resource (PCR) and Chance Finds Procedure

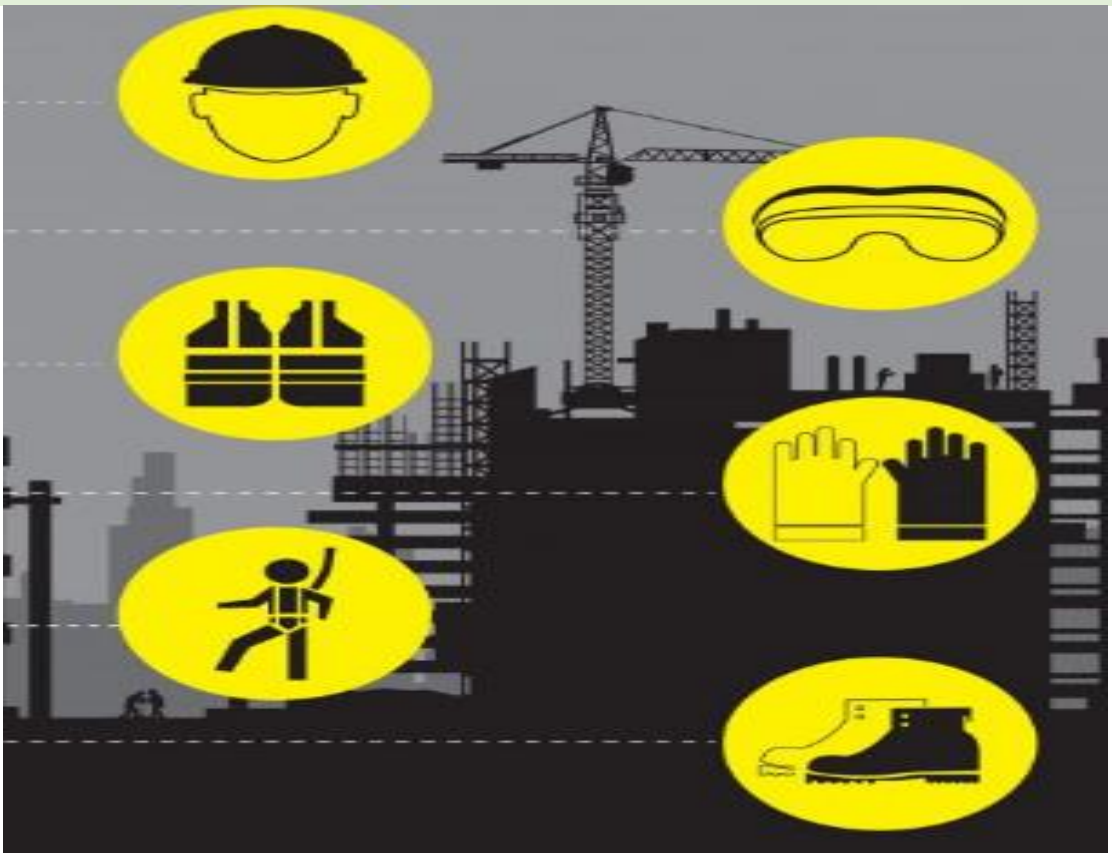
In the case of a Physical Cultural Resource (PCR) chance find, the following procedures shall be followed:

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 EDCL, 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 authorization 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 Implementation Supervision Reports and Implementation Completion Reports will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

Appendix 1: Occupational Health and Safety Plan

OCCUPATIONAL HEALTH, AND SAFETY PLAN FOR THE DESIGN, SUPPLY, AND INSTALLATION OF MEDIUM AND LOW VOLTAGE LINES, SERVICE CONNECTIONS, AND UPGRADING THE SINGLE-PHASE LINES TO THREE PHASES IN THE WESTNORTHENPROVINCE OF RWANDA



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ACRONYMS AND ABBREVIATIONS

BESST : Bureau for Engineering and Environmental Studies
AfDB : African Development Bank
EA : Environmental Assessment
EDCL : Energy Development Corporation Limited
EPC : Engineering Design, Procurement and Construction
HSP : Health and Safety Plan
ESHS : Environmental, Social Health and Safety Plan
ESIA : Environmental and Social Impact Assessment
ESS : Environment and Social Standards
GoR : Government of Rwanda
IFC : International Finance Corporation
MININFRA : Ministry of Infrastructure
OHS : Occupational Health and Safety
OS : Operational Safeguards
PPE : Personal Protective Equipment
RDB : Rwanda Development Board
REG : Rwanda Energy Group
REMA : Rwanda Environment Management Authority
MoE : Ministry of Environment
WBG : World Bank Group
WMP : Waste Management Plan
PS : Performance Standard

1. INTRODUCTION

This Occupational Health and Safety Plan (OHSP) has been developed to design, supply, and install medium and low voltage lines, service connections, and upgrade single-phase lines to three phases in the WestNorthenProvince of Rwanda. OHSP has been prepared in compliance with Rwanda regulations especially law no 48/2018 of 13/08/2018 on environment and law no 027/2023 of 18/05/2023, the World Bank Environmental and Social Standards, and African Development Bank Operational Safeguards Policies**.**

The OHSP delineates and details actions to be implemented to identify not only general risks but also potential hazards specific to the project and establish the procedures to mitigate them. The plan is established to assist the Project implementing entity in achieving its "Zero Accidents" objective. It serves to inform and define the OHS regulations that must be adhered to by all Contractors, subcontractors, and workers, involved in project activities.

1.1. Objective of Occupational Health and Safety Plan

The objective of OHSP is to define the set of measures for the prevention of risks likely to arise from the execution of different activities on site. The OHSP encompasses a package of protection/prevention measures complementing the context of the ESMP and emphasizing health and safety issues to be considered during the overall project cycle.

Specifically, the Occupational Health and Safety plan:

- ✓ Provides instruction and guidance to the Project team, including contractors and subcontractors, on the development and implementation of project-specific Health and Safety requirements;
- ✓ Guides on how to identify and incorporate safety considerations as related to detailed design and construction;
- ✓ Guides how to identify coordination and collaboration arrangements of the detailed design and execution phases of the project;
- ✓ Provides the minimum requirements of safety in the subproject site to be achieved;
- ✓ Guides how to ensure compliance with all relevant statutory requirements;
- ✓ Inform contractors and subcontractors in advance of the Occupational Health and Safety requirements that shall be strictly enforced on the Project;
- ✓ Informs the Consultant Firm, of the content of the project's Environmental, Social, Occupational Health and Safety program and relevant responsibilities under current Regulations ;
    - ✓ Establishes a framework for the implementation and sequencing of Occupational Health and Safety initiatives across the various phases of Construction activities;
    - ✓ Establishes roles and responsibilities associated with the Occupational Health and Safety Management Manual;
    - ✓ Eliminates and prevent any health, safety, community, and any OHS related hazards within the working environment, and control the hazard at its source as possible ;
    - ✓ Promote safety consciousness among all employees, contractors, subcontractors, and visitors within the project premises.

1.2. Scope of application

This OHSP must be applied to the entire project cycle of design, supply, and installation of medium and low voltage lines, service connections, and upgrading single phase lines to three phases in the NorthenProvince of Rwanda as well as, employees and subcontractors. This document must be considered as a minimum requirement and the application of this plan is the direct responsibility of the EDCL management and all employees, subcontractors, and Contractors involved in its day-to-day operation.

1.3. Project Location and Activities

This OHSP is for the design, supply, and installation of medium and low voltage lines, service connections, and upgrading single phase lines to three phases in all districts of the Northenprovince namely Kamonyi, Muhanga, Ruhango, Nyanza, Huye, Gisagara, Nyaruguru and Nyamagabe to improve the rate of access to electricity supply countrywide. The main component of the present project is the construction of electrical distribution networks in different sectors and service connections to the local population. The focus is to connect households and public institutions (schools, administration offices, health centers, etc) and productive users (small industries where applicable). During the project implementation, different activities will be done, and these are divided into 4 phases: (i) Design and Planning phase, (ii) Construction Phase, (iii) Commissioning Phase, and (iv) Operation Phase.

1.3.1. Design and construction phases.

During the Design and Planning Phase, there will be a process of survey and mapping for new transmission and distribution routes and transformer locations to avoid harming sensitive ecosystems. There is no land acquisition for MV and LV lines as there will be passing in land for agriculture; only, it will be a compensation process for the crops and trees damage.

- ✓ **ROW Clearance**

During the construction phase, it will be the process of clearing the Right of Way (ROW) as the initial activity that will occur during the construction phase. This is done to create the vertical and horizontal clearance required when constructing power lines. The clearance will be done on 12 meters large (6 m each side from the center line). However, only trees and crops that can grow to more than 3 meters in height will be cleared on 12 meters; the short crops will be damaged by the passengers only and it is expected to be minimum like not more than 2 meters large. The asset valuation will be done to 12 meters and will cover all trees and crops on that surface. In case a residential house is found within the 6 m will be relocated and fair compensation will be done. However, maximum efforts will be made during the line route design to avoid houses under the RoW.

1.4. Foundation excavation and pole erection

Foundation excavations and erection of poles will consist of creating the foundations for erecting poles. The general outlines of the poles may be varied but the general dimensions, phase spacing, clearances, and the configuration of the conductors and earth wire are those applied to similar projects being implemented countrywide.

- ✓ **Installation of transformers.**

MV/LV transformers will be installed at different sites along the transmission lines. These transformers will play the role of stepping down the electricity from MV to LV before distribution to consumers.

1.3.2. Operation phase and Maintenance of the RoW

During the operation phase, it will be operation and maintenance of the transformers and the lines, that will have been installed during the construction phase. It is important to note that REG will no longer use transformers containing PCBs (as commonly used in old equipment) which are harmful to the environment and humans.

Just as for the line, maintenance for the transformers is required. It must provide for the regular replacement

of coolants and lubricants for transformers. However, this is not frequently done unless where it is required to be. REG has indicated that they would use no more transformers containing PCBs because of their toxicity against the environment and human beings.

1.3.3. Decommissioning phase

During the decommissioning phase, it will be dismantling and removing all the structures from project construction sites, dismantling the supporting infrastructures and all those structures that were associated with the project implementation. The project also will rehabilitate the damaged sites to their former status or near what they were before the project was commissioned.

The transmission line requires clearing a permanent ROW. Its width generally is 12 m wide. Trees along the ROW must also be cleared for the safety of the lines.

The regular maintenance of the ROW will be done to maintain clearance, among poles, conductors, and all the vegetation or structures. Those maintenance operations will normally take place twice a year but may vary according to the local conditions of the project areas.

2. POLICY STATEMENT, ROLES, AND RESPONSIBILITIES

2.1. Occupational Health and Safety Policy Statement

It is EDCL's policy to manage its business affairs safely and to ensure the safety and well-being of all personnel involved in the project. This is reflected in this Health, Safety, and Environment(OHSP) plan that EDCL has adopted for all its project activities.
EDCL recognizes the following obligations and principles:

- Each employee has a right to work in an environment that will not adversely affect his or her health and safety;
- Is committed to providing safe workplaces for all its employees;
- Is committed to protecting the health and safety of its contracting parties and the public;
- Will diligently carry out the duties contained in the OHSP plan;
- Will minimize the risk of occupational injury, illness, and property damage;
- Monitors the continuous implementation of OHSP programs;
- Ensures that contractors, managers, and supervisors identify and control workplace hazards and communicateinformation about those hazards throughout the workplace.

Every employee has a personal responsibility to become involved in solving OHSP hazards. To achieve this, all employees must work together to identify and control situations that could causeharm. It is EDCL's priority to integrate OHSP practices into daily activities headed by project personnel, from project managers to site managers, to foremen, to linesmen, to maintain an engrained OHSP culture throughout the organization.

2.2.Zero accident policy

The creation of an "Incident Free" environment within the project requires a thorough understanding and acceptance of the principles explained in the OHSP plan. EDCL will stand for activities free from incidents to be consistent in delivering safe, productive, and efficient project deliverables prioritizing a zero-accident performance. EDCL will ensure the implementation of the following principles:

- ✓ The immediate identification and elimination of unsafe work practices and conditions at any workplace.
- ✓ Elimination of human error as a source of incidents, irrespective of rank or position in the organization.
- ✓ Building a team safety mentality where each worker contributes to the effort and each supervisor is fully aware of the capabilities and limitations of their team either individually or collectively.
- ✓ A culture in which everyone accepts responsibility and accountability for their own and each co-

worker's safety and health.

2.3. Incident readiness

It is the personal responsibility of each employee to ensure that the action taken by them does not endanger the health and safety of other colleagues. The person to be contacted and the relevant telephone number, in case of any incident, shall be known to all personnel.

They must ensure and be made aware that:

- ✓ Being familiar with the location of first aid boxes and fire extinguishers in the areas in which they work
- ✓ Providing support within their competence
- ✓ Calling for further help if necessary
- ✓ Coordinate Search and Rescue Teams.
- ✓ Determine the need for medical assistance.
- ✓ Administer first aid as needed.
- ✓ Keep a record of types of injuries and aid provided.
- ✓ Mitigate emotional trauma.

2.4. Personal initiative empowerment

It is the personal responsibility of each employee to ensure that the action taken by them does not endanger the health and safety of other colleagues. They must ensure and be made aware that:

- ✓ They and the company are responsible for their safety and health and for other personnel on site;
- ✓ They should understand potential hazards and their likely effect;
- ✓ They must report any accident immediately to their supervisor;
- ✓ They must always keep the workplace in a clean and tidy condition and must not interfere with or misuse any protective equipment that has been provided for the safety site personnel;
- ✓ They must use all personal and mechanical protective equipment provided for them by the company for their safety and well-being;
- ✓ They must report any unsafe conditions and practices to their supervisor;
- ✓ They must always comply with all statutory and client requirements;
- ✓ They must assist the company management in achieving the goals and objectives of the safety plan;
- ✓ They must understand the safety plan its objectives and its support activities where no item of safety shall be ignored or deferred.

2.5. Continuous Improvement

EDCL is dedicated to the concept that all accidents are preventable. Accordingly, EDCL has adopted and committed to achieving and sustaining a “ZERO ACCIDENT” culture through continuous improvement practices. This applies also to its contractors and subcontractors who should:

- ✓ Strive to eliminate all occupational injuries and illnesses;
- ✓ Promote health, safety, and environment program objectives as a constant value in designing, planning, training, and executing work;
- ✓ Spread ownership for health, safety, and environment program effectiveness throughout the company’s s organization;
- ✓ Increase employees' consistent use of safe practices in their daily work activities;
- ✓ Optimize the use of continuous improvement practices as the basis for zero accident initiatives;
- ✓ Promote the opportunity for employees and affected communities to submit concerns about OHSP through feedback channels to collect possible complaints.

2.6. OHSP Management team and responsibilities

Project managers, site managers, site supervisors, foremen, linesmen, etc. shall be familiar with the OHSP rules, regulations, and laws that apply to the project. They shall document all actions taken to ensure compliance with this OHSP plan. Site personnel and its management will participate in scheduled project activities, site audits, and safety walks,and will implement and document all required corrective actions.

The site management team will attend and will communicate OHSP expectations and will conduct orientation sessions for all employees, selected suppliers, and subcontractors working in/with the project site. The specific responsibilities and authority of OHSP management are detailed as follows:

2.6.1. Project Manager

- Demonstrate ownership, and leadership and actively participate in all phases of the OHSP Plan
- Provide management support necessary to carry out OHSP system requirements;
- Participate and support OHSP initiatives and preventive actions;
- Lead by positive example
- Communicate personally with direct reports on OHSP issues related to their area of responsibility;
- Inspection of OHSP documentation and working places

2.6.2. Site Manager

OHSP role/function is an area for which the Project Manager is fully responsible, it is allocated to the Site Manager who will ensure that OHSP practices are implemented by the Site Supervisors. The Project Manager is responsible for the overall Project OHSP and the site manager is responsible for the on-site OHSP management of the project.

The site manager is responsible for:

- ✓ Familiarization with and assist in the interpretation of all local, national, and international laws that apply to project operations;
- ✓ Prioritizing and producing a strategy for implementing the various elements of the OHSP plan and ensuring that it is being communicated effectively throughout the project organization and subcontracting companies;
- ✓ Reporting continuously to the management team on implementation progress, points of concern, and topical points of issue regularly;
- ✓ Being the custodian of the OHSP plan;
- ✓ Ensure that EDCL personnel and subcontractors comply with the required Personal Protection Equipment (PPE) as required by the OHSP plan;
- ✓ Seeking assistance from the project manager for specific parts of the OHSP plan;
- ✓ Updating and giving feedback to the OHSP plan based on observed circumstances;
- ✓ Establishing and maintaining a professional relationship with the employer's representative and with the subcontractor company's representatives to ensure that OHSP practices are implemented during daily operations;
- ✓ Providing direction as necessary to attain safety management standards and goals required by the safety program;
- ✓ Ensuring that sufficient training and daily induction of all personnel is being provided and maintained;
- ✓ Developing the safety awareness of all personnel employed on the project via the various OHSP programs, and ensuring their participation in all aspects OHSP program;
- ✓ Overall safety administration and resources for the entire duration of the project;
- ✓ Identification of all hazard-related activities and development of specific contingencies in preventing any work-related accidents;
- ✓ Define a program for visits and safety inspections of work sites, storage areas, and fabrication yards;
- ✓ Report procedures and keep records for loss prevention.
- ✓ Preparation, monitoring, review, and updating of the Environmental Plan;
- ✓ Assist the Project Manager with environmental problems;
- ✓ Verify the implementation of the Environmental Plan and the Work Environmental Plan;
- ✓ Determination and reporting of the principal causes of Environmental problems to the EDCL Project Manager;
- ✓ Participate actively in OHSP promotional activities;

- ✓ Conduct daily Pre-Job Briefings on-site (Toolbox meetings) to ensure all OHSP guidelines are understood and followed.

2.6.3.Site Supervisors/ Foremen

The Supervisors/Foremen reports to Site Manager, and he is responsible for:

- ✓ Be familiar with, explain, and enforce OHSP regulations that apply to project operations;
- ✓ Ensures that safety devices and PPE are used by persons under his supervision;
- ✓ Instructs and trains all persons within the area of responsibility in job OHSP requirements, including hazard recognition and avoidance, and requires compliance by workers with the safety rules established;
- ✓ Conducts as often as needed safety briefings with all workers under his supervision;
- ✓ Conducts informative toolbox talks every day before the start of activities;
- ✓ Ensures that injuries are treated promptly and reported properly;
- ✓ Investigates all accidents/incidents, obtains all pertinent data, and initiates corrective action;
- ✓ Conducts frequent and regular safety and health inspections of his work areas and ensures that no unsafe conditions exist in responsibility.
- ✓ Reports to the Project Manager/OHSP Manager on any corrective actions needed which are beyond his control;
- ✓ Ensures that adequate inspection and maintenance of the equipment has been carried out;
- ✓ Identifies defects and incidents and ensures that corrective action is taken;
- ✓ Stops the operation whenever an unsafe condition is identified;
- ✓ Ensures the completion of the work method statements and procedures.

2.6.4. Subcontractors

Being consistent with contractual obligations, all subcontractors shall fully comply with the Contractors' E&S commitments, subcontractors are responsible for:

- ✓ Subcontractor management promotes, supports, and actively participates in the “Zero Accident” philosophy.
- ✓ Implementing the sub-project OHS Plan as well as the subcontractors` own OHS plan;
- ✓ Identifying the hazards of their work, assessing the risks arising from these hazards, and informing how these risks will be controlled.
- ✓ Providing a safe and healthy work environment for their personnel;
- ✓ Complying with local OHS legislative requirements;
- ✓ Providing OHS information to the workers;
- ✓ Issuing to any lower-tier subcontractors a copy of the health and safety plan and any other applicable safety and health procedures;
- ✓ Developing and maintaining risk assessments for all site construction activities.

2.6.5. Workers

Each worker/ who is performing their working duties is responsible for assuring the safety for themselves; Safety for fellow employees; protection for the public; and protection for sub-project property and for public and private property. Workers will be in charge of the following:

- ✓ It is the responsibility of each worker to notify his senior or the designated OHS Officer or the Construction Project Manager once an unsafe condition or act is witnessed on the job.
- ✓ When a worker is requested to perform duties under unsafe conditions, the worker should not perform those duties without first notifying the person in charge of the unsafe conditions. On the other meaning, no one should be in unsafe conditions. Rather than risky work, there should be certain safety measures that should be provided and followed to minimize the risk and ensure the safe implementation of the activity. It’s the responsibility of the contractor to provide and request the workers to use the PPEs;
- ✓ It is the responsibility of each worker to attend safety training and meetings where possible and to take an active part in safety work. It is the responsibility of each contractor to ensure workers

know and understand the safety rules of this Plan Manual, and the sub-project OHS Plan, which will apply to the work being performed.

3. OCCUPATIONAL HEALTH AND SAFETY PROCEDURES

3.1. Identification and Evaluation of Risks

3.1.1. Risk identification.

To identify the risks to the safety of the persons present on and near the site, the following rules shall be applied;

- Analysis of the work activities foreseen in the method statement. The Method Statement analysis shall be carried out before the commencement of the works, by the Resident Site Manager and the OHS officer to evaluate the risks related to the work activities,
- Identification of potentially dangerous activities,
- Risk factors identification,
- Risk evaluation based on the probability that the event (accident) will occur (probability) and the effects on the health of persons involved (damage) based on the experience held by the Contractor's similar projects or work conditions,
- Checking safe work procedures.

3.1.2. Method of evaluation

To evaluate the safety of the persons, present on and near the site, the following rules shall be applied;

- Analysis of the work activities foreseen in the method statement. The Method Statement analysis shall be carried out before the commencement of the works, by the Resident Site Manager and the Safety Officer to evaluate the risks related to the work activities,
- Identification of potentially dangerous activities,
- Risk factors identification,
- Risk evaluation based on the probability that the event (accident) will occur (probability) and the effects on the health of persons involved (damage) based on the experience held by the Contractor's similar projects or work conditions,
- Checking safe work procedures.

3.1.3. Hazard identification

The following risks have been identified because of the analysis of the work activities together with the tools, equipment, facilities, and dangerous or potentially dangerous materials that shall be used or present on site;

Risks for safety have therefore injuries or physical damages:

- **People falling to the ground**: Slides and falls on the plane of the job, provoked by the presence of oil, grease, or dirt on the points of grip (in the case of slope on means or cars), tripping hazards in the workplace, (for example miscellaneous debris or cords) or from bad conditions of the pedestrian visibility created by poor lighting.
- **People falling from high places (higher than 2m**): People fall from high places, due to the loss of equilibrium of the worker and/or to the absence of suitable protections (collective or individual), slips or trips, from improperly constructed temporary work, crane or within overly steep excavations, lifting or transport vehicles, or from any other higher job posting;
- **Drop of materials or tools**: Materials, tools, or objects dropped down from higher working places or fallen during transport with trucks, cranes, or other lifting means. Materials projected by blasting;
- **Running down by vehicles**: Personnel being rundown by improperly operated vehicles or allowing personnel to be in restricted areas or by personnel error;
- **Blows, knocks, impacts & compressions**: caused by violent contact with equipment, structures, or other object present in the workplace;
- **Pricks, cuts & abrasions**: cuts, punctures, and abrasions to the hands; bruises and traumas to the whole body without a specific location, for contact with the used utensil or consequent to bumps with any kind of object present in the work yard;

- **Heat, flames**: the accidental contact with parts or tools at high temperatures (welding tools, grinders, parts of engines, etc..), flames or materials (bitumen, hot liquids, etc..), the prolonged exposure to the heat or sunlight causes burns;
- **Electrocution or Fulguration:** Electrocution for direct or indirect contact with under-tension parts of the electric line or equipment;
- **Jets, squirts:** Lesions in any part of the body during the jobs performed by hand or with utensils, with material, substances, products, and equipment that can cause jets you squirt dangerous for the health. Lesions concerning any part of the body consequent to the projection of splinters or fragments during workmanships performed directly or in neighbouring postings of the job;
- **Hurling of particles into eyes**: Lesions at the eyes consequent to the projection of splinters or fragments during workmanships performed directly or in neighbouring postings of the job;
- **Fire explosion:** Lesions provoked by fires and/or consequent to the explosion due to the combustion of containers or reservoirs containing fuels, gasses, or chemical substances highly deflagrating or to the blasting of explosives;
- **Vehicle accident**: includes accidental contact between two or more vehicles or between a vehicle and a person.

Risks for health that need long exposure to the risk:

- **Vibrations and Noise:** damages to the skeletal and muscular apparatus caused by the vibrations transmitted to the worker by equipment, tools cars, or parts of them; damages to the auditory apparatus caused by the prolonged exposure to the noise produced by the processing, tools, equipment, or plants;
- **Dust, fibres:** Damages to the respiratory apparatus and in general to the health of the worker, consequently to the exposure to fine course materials, or materials releasing minute fibres;
- **Non-Ionizing Radiations:** prolonged exposure to non-ionizing radiations as electromagnetic fields with extremely low frequencies, radio frequencies, microwaves, infrared, etc.;
- **Mineral Oils, hydrocarbons**: Dermatitis, coetaneous irritations, allergic reactions, or damages to the respiratory apparatus caused by the contact with mineral oils or hydrocarbons or inhalation of the vapours developed during the process;

Other risks are caused by an incorrect organization of the job site.

- **Loads manual handling**: Lesions to the skeletal and/or muscular apparatus during the manual handling of loads, because of their excessive weight or dimension or due to the incorrect position assumed by the worker during the handling;
- **Ergonomics**: Muscular pains because of wrong positions assumed during the use of the equipment;
- **Interferences**: Presence of different activities in the same or near the working area which can interfere and transfer risks of one activity to the workers engaged in another.

3.2. Risk assessment and Management.

3.2.1. Safety Inspections

Safety inspections will be made continuously by the site manager or appointed representative to identify any situation that could result in possible hazardous conditions before the start of work and as needed throughout the work. Where a safety representative finds evidence of a situation that could result in possible hazardous conditions, exposed employees will be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

3.2.2. Job hazard analysis

Job hazard analysis is a procedure that serves to identify risks associated with activities that need to be performed during the project implementation. The analysis identifies risks and control measures are defined to ensure that such risks do not materialize when conducting the work. Based on the output of the

analysis, activities shall be planned so that they are carried out under specified conditions to control the risks.

The project manager, site manager, and site supervisor shall prepare a Job Hazards Analysis for all important and higher-risk construction works. The job hazard analysis will assess the risks of the task to ensure that the health, safety, and environmental risks posed by the project activities are as low as reasonably possible. The job hazard analysis shall be a complement of the work method statements where local conditionsfor the project implementation will take place, these shall include:

- ✓ Reference to work method statements that describe the sequential steps of the task including before, during, and/or after the task;
- ✓ Hazards and risks posed by the task to people performing the task and to third parties;
- ✓ The need for PPE;
- ✓ Any limitations on other activities posed by the task and/or by adjacent activities;
- ✓ Any emissions to the environment resulting from the task.

The assessment will be performed early enough to allow any changes to the proposed task to be incorporated as necessary. For repetitive low-risk tasks, a generic job hazard analysis may be used.

3.2.3.Stop work authority.

Everyone involved in the project and site activities will have the responsibility and authority to ensurethat all personnel at the site always comply with the safe operation resulting in zero accidents. At the project site, everyone is authorized to stop work that does not comply with a safe operation. EDCL guarantees that there will be no repercussions for the persons who stop the work for any given reason.

3.3. Personal Protective Equipment

Personal protective equipment (PPE) protects employees from the risks of injury by creating a barrier against workplace hazards.

3.3.1.Appropriate personnel protective equipment

PPE must be used when the eyes, face, hands, extremities, or other parts of the body are exposed to workplace hazards that cannot be controlled by other means.

- **Head protection** will be worn on job sites when there are potentials of falling objects, hair entanglement, burning, or electrical hazards;
- **Eye protection** will be worn when there are potentials of hazards from flying objects or particles, chemicals, arcing, glare, or dust;
- **Protective footwear** shall be worn to protect from falling objects, chemicals, or stepping on sharp objects. Athletic or canvas−type shoes shall not be worn;
- **Body protection like overalls**, raincoats, etc. shall be provided and worn in all those activities where risks for the body (acids or corrosive substances, burns, pricks, cuts, abrasions, etc.) are present;
- A**ppropriate respiratory masks** shall be provided to prevent damage to the respiratory apparatus in the presence of dust, gasses, or other substances;
- **Protective gloves** or clothing shall be worn when required to protect against a hazard;
- **Harnesses and lanyards** shall be utilized for fall protection as required;

The use of other PPE shall be evaluated from time to time and provided and worn to the workers involved in the activity or exposed to the risk.

- **Distribution of PPE**

All new employees, before starting their activities, shall be provided with all the protective equipment needed in connection with the risks they can be exposed to in the course of their duties. Special PPE will be given to the workers in case of activities to be carried out. At the act of the delivery of the PPE, each worker shall be informed and trained on the correct way to use and conserve them. Each worker will sign

for receipt of the PPE. Records of all the PPE given to each single worker, including any replacement, shall be kept, using individual cards, from the safety Department. The PPE will be replaced periodically or whenever they are damaged in a way to is useful for safety purposes. Checks shall be carried out on the existence, use, and condition of the personal protections assigned to each worker. Each worker who is found on site without the PPE will not be allowed to work and shall be sent out of the job site and sanctioned. If the item is misused, misappropriated, or lost, the worker shall be strictly sanctioned.

3.3.2.Type of Personal Protective Equipment (PPE)

Personnel at the project site shall wear appropriate PPE according to their area of work. PPE shall include but not be limited to:

- ✓ Head Protection / Hard hat with chin strap;
- ✓ Eye Protection / Safety Glasses with side covers;
- ✓ Foot Protection (Safety Boots);
- ✓ Hand Protection (Hand gloves);
- ✓ Flame, electrical and mechanical Resistance (Hand Gloves, Sleeves, boots, etc...);
- ✓ Face Protection (face shield);
- ✓ Fall protection (harness and fall protection equipment);
- ✓ Protective Clothing;
- ✓ High visibility safety Vest;
- ✓ High visibility clothing with reflecting bands;

The minimum required PPE includes a hard hat with a chin strap, a high visibility safety vest, and safety boots with steel caps and ankle support. The PPE is to be used all the time. Employees are expected to report to work in adequate and appropriate construction clothing. Long pants and a T-shirt, both in good condition, are the minimum acceptable. Going shirtless is prohibited.

The distribution of PPE will be controlled with a form that will be filled during the distribution of the equipment. PPE distribution will be accompanied by a related training focusing on the correct use, maintenance, fault detection, disposal, and storage of each type of PPE. The site manager will keep control of the PPE required on-site and used by the workers. The project will have an adequate number of the above PPE for the replacement of damaged and out–of–standard PPE.

3.3.3.PPE for working at Heights.

Working at heights represents one of the most critical risks in the project. In addition to work preparations) special PPE shall always be used when conducting any activity under these circumstances. It is working at heights when the work implemented is 2 meters or more from the ground level.

- **Harness**: including hardware must be capable of withstanding a tensile loading without cracking, breaking, or taking a permanent deformation
- **Lanyard**: The lanyard must be a rope or shock-absorbing web lanyard. The lanyard and all its components in a fall arrest system must have a tensile strength. Locking-type snap hooks shall be used to connect the lanyard to the harness. The lanyard may be retractable allowing freedom of movement but protects the worker should a fall occur. A shock-absorbing lanyard will substantially reduce the force created during a fall. The maximum lanyard elongation when resisting a fall must not exceed 1.06 m in length.
- **Lifeline:** The lifeline can be horizontal or vertical. Vertical lifelines may only support one worker.
- **Rope Grabs:** A person may be connected to a lifeline using a rope grab or by a rope grab and lanyard combination. The lanyard must be less than 1.8 m long to restrict the overall fall to 1.8 m or less. The lifeline size must be stamped on the rope grab, and only that size and type of line used.
- **Anchorage:** The strength of any fall protection system is dependent on a secure attachment point.
- **Rigging**: Anchor points should be as high as possible, but never lower than the connection point on the harness. Workers must be tied off in a manner that ensures no lower level, or other

surfaces are struck during a fall.

3.3.4.PPE maintenance and storage

The site manager and/or personnel allocated with the responsibility will ensure that reusable PPE is regularly inspected and tested under the manufacturer's specifications and the relevant Standards.

- ✓ All persons have a responsibility to verify the conditions of PPE before and after use to detect defects.
- ✓ All persons using a fall protection system must be trained on the safe use of the system including Proper fit, wear, inspection, limitations, and care of the system. Fall protection systems must be inspected before use, at intervals as established by the manufacturer.
- ✓ Cleaning agents or equipment will be supplied by the site manager to enable employees to clean reusable PPE as required.

3.3. Signs and markings

Signboards indicating the obligation to wear PPE, or other safety measures, as well as dangers or hazards, will be placed at the entrance and in the proximity of each working area. There are three major types of signs and markings, the samples of which shall be established in due time.

- **Warning signs:** are used to properly identify and warn of possible hazards. They should have a triangular shape, black text on a yellow background, and should always include a pictorial symbol.

Danger Noise Electrical Suspended Forklift Flammable Loads

Falling from High places Welding Battery acids Explosion radiation

Mandatory signs: indicate that a particular course of action must be undertaken. They should have a round shape and a white pictorial symbol on a blue background.

Generic Helmet Ear Protection Respiratory Protection Eye Protection Protective Gloves

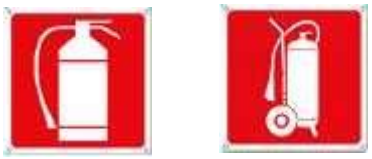
Prohibition signs: are used to properly give a clear message that a certain action is prohibited. They should have a round shape, black pictorial symbol, white background, red border, and 45-degree red diagonal band across the symbol (from upper left to lower right).

Do not Smoke	Not drinkable Water	Halt	Do not use in case of fire

Safety signs: are used to properly identify the locations of emergency equipment. They have a green background with white pictorial symbols.

Emergency Exit First Aid Meeting Point

Fire-fighting signs: Each item of Fire-fighting equipment should be marked with the appropriate symbol. Where various types of equipment are stored at one location, `Fire Point" signs may be used. When equipment is stored in a recess or cupboard, a panoramic sign, mounted well above head height, should be used to enable the equipment to be identified from a distance.



Fire Extinguishers

The proper use of these signs and the appropriate compliance with their indications shall prevent potentially dangerous situations and accidents.

3.4. Incident and accidents management

3.4.1. Incident Notification and Reporting

Contractors will notify the Project immediately following any environmental or social incident. The project will ensure that all environmental and social incidents are appropriately documented that the relevant parties are notified and that reporting requirements around the incident are met.

3.4.2. Injury and accident management

In case of injury, accident, or near miss, the workers involved must immediately report it to their Foreman, regardless of the seriousness of the event. Based on the nature/sources of the event (related to environment, health, or safety), the Foreman must implement promptly the emergency management procedure and inform the assigned Supervisor and the OHS Officer, for safety as soon as practicable. The OHS officer in collaboration with the Supervisor must immediately fill out the “notification report” and submit it to the SE. The SE must transmit it to the responsible persons based on the magnitude of the event. In case of a high-level injury/accident, the PM must be immediately informed by the SE. The PM must inform OIA management, the client, and the supervising engineer. The form filled by the OHS Plan shall include

the following details;

- Description of the event;
- Causes of the event;
- Damages;
- Injury;
- Personnel or equipment involved in the event;
- Time of the Event;
- Place of the Event;
- Witnesses;
- Corrective Actions;
- Further information/attachments.

Whenever needed the OHS officer will request persons involved in the event or witnesses to provide input in the investigation form. The completed form must be then sent to the SE and subsequently to the PM for approval. Special attention to:
Corrective measures identified and carried out with the designation of the responsible for corrective action and estimated date of closure;
Proposed additional corrective measures with the designation of the responsible for corrective action and estimated date of closure.

Accident cases must be discussed during specific Safety Talks, called as soon as possible by the OHS Officer and involving at least the Supervisor, SE, and the foreman having witnessed the event. Record of the meeting must be prepared by the OHS Officer and transmitted to all the participants. At the estimated scheduled corrective action date of closure, the OHS officer checks the implementation of the action. In case the required actions have not been fulfilled the OHS officer requires the support of the PM and calls a Safety Talk involving at least one Supervisor.

The OHS officer must fill out the "Monthly Injury Report and HS metrics" In addition, after any injury/accident/near miss event, the OHS officer must update the "record book". The PM, according to information contained in the Monthly Injury Reports and injury/accident reports, must fill monthly overall reports that must be sent to the Site Client Representative.

3.4.3. First Aid and Emergency Medical

Provisions shall be made so that response times are not exceeded.

- ✓ an injured person will be treated by a first aider **within 5 minutes of the incident**.
- ✓ a seriously Injured person will be treated by a medical professional **within one hour of the incident**. This will normally be at the hospital, or a suitable health Center.

Numbers of First Aiders

Where 5 – 50 workers there should be at least one qualified first aider present all the time. A further first aider is required for every additional 50 workers. A team member can act as a first aider if he/she holds adequate training.

It may be that additional qualified first aiders are required to achieve the response times detailed in this sheet. Also, if there are additional hazards and risks.

First Aid Kits on Site

- ✓ All projects and work areas must have at least one first aid kit. With additional kits for each 50 workers.
- ✓ First aid kits shall be constructed of resistant material, dustproof, and of sufficient size to store the required contents. They must be capable of being sealed and have a handle for emergency transport.

✓ The exterior of the first aid kit must be labelled in a manner that will identify, for example - “First Aid”.
✓ Contents of the kits shall be suitable and sufficient for the site.

3.4.4. Incident report and notification

WORK-RELATED INCIDENT	**The incident happens at EDCL-controlledworksites or at time**	**EXAMPLES:** All work-related travel and transportation by EDCL rented vehicle / All activities at company worksite and office.
NOT WORK-RELATED INCIDENT	**Incident which does not happen at EDCLcontrolled situation**	**EXAMPLES:** Travel from home to office / Injure at accommodation / Social events and customer entertainment / Sports supported by company / Transport by vehicle that is not dedicated to project use (bus, taxi).
	Actions	**Notes**
FATAL or LIFE-THREATENING ACCIDENT	**immediately 24/7** by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	**Ensure that the message goes through.** You must send additional detailed information by email within 12 hours of the accident.
ENVIRONMENT, MAJOR ROAD or OTHER ACCIDENT	daytime within 24 hours by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	An accident that affects many people. You have to send additional detailed information by email within 12 hours of the accident.
LOST TIME INCIDENT (WITH BODILY INJURIES)	daytime within 24 hours by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	**The incident resulted in more than one day's absence from work.** For example, when a person is taken to hospital and is not able to work the next day. E.g. a tool fell from a pole and hit a ground man’s head that requires stitches.
RESTRICTED WORK	daytime within 24 hours by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	When a person suffers an injury but is relocated to work with alternative works E.g. a person injures his arm and can't do site work, the person is sent to do office work
MINOR INCIDENT (WITH BODILY INJURIES)	daytime within 24 hours by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	When first aid is provided, the injured person can return to regular work the following morning or can do substitute work during the recovery period. NOTE: When only a third party is injured, this is treated as a Near Miss. E.g. a tool fell from a pole and hit the hand of a person on the ground causing a minor wound that is treated with plaster

NEAR MISS (NO BODILY INJURIES)	daytime within 24 hours by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	**An incident that occurred already but it did not cause any personnel injury.** E.g. a tool fell from a pole but did not hit anybody or hit the helmet without injury.
POTENTIAL INCIDENT (NO BODILY INJURIES)	daytime within 24 hours by phone, SMS, or email. Site Manager/Local Project Manager informs Project Manager The Project Manager informs the Project Director, who in return informs the Managing Director.	**An event that could happen in the future if it is not prevented by preventing action.** E.g. a tool could fall because it is not put properly into the tool pocket. E.g. car tires are slippery and may not be safe if rains.

3.4.5. Contact information:

A list of contact persons in case of emergency will be disclosed to all site workers. this includes contact for the site manager, EHS staff project manager, a nearby hospital, nearby Police Station Traffic, and Road Safety; Fire Brigade, Traffic Accidents; Child-Help Line; Anti-GBV; Anti-Corruption; and Ambulance only to mention but a few.

3.4.6. Communication

EDCL recognizes that the objectives of OHSP can only be achieved with effective communication. With this in mind, numerous mediums will be used to educate, raise OHSP awareness, motivate and stimulate participation. These may include:

- ✓ Safety Bulletins;
- ✓ Clear meeting agenda and meeting minutes;
- ✓ Bulletin boards, posters, or banners
- ✓ E-mail communication;
- ✓ Reports and Campaigns;
- ✓ Toolbox talks;
- ✓ Job hazard analysis.

3.5. Material and works handling.

3.5.1. Electrical facilities and installation

- Electrical connections and related works must be performed by qualified electricians, or under strict supervision of qualified professionals.
- Electrical systems shall comply with the local regulations on High and Low Voltage Facilities.
- The distribution centers shall consist of standard steel cabinets, with a mounting plate at the rear, readily accessible from the outside. They have doors fitted with thumb latches and triangular keys and are suitable for the installation of padlocks.

In addition, they are provided with the following:

- Automatic sectionalizing switch;
- Grounding network (the resistance of the grounding network shall not be greater than that against which it protects, depending on the sensitivity of the differential breaker);
- Differential circuit−breaker.

The differential circuit breaker shall have medium sensitivity in the usual case that the equipment and machines are connected to the ground network and the resistance of said equipment does not exceed 20 Ohms. To protect against overloads and short circuits, the provision shall be for automatic fuses of the magneto−thermal type. From these general distribution centers, connections shall be made for the secondary circuits, which, in turn, shall be provided with cabinets fitted with watertight inlets, with the power

being supplied always through a female socket. Such secondary boards shall be provided with a general ground terminal, a standard Omni−pole circuit breaker (with circuits calibrated for each of the taps, a maximum of three), and a high−sensitivity differential breaker (30 mA). Where portable devices are used in high−humidity areas, provision shall be made for safety transformers, with a maximum rating of 220 volts, or a safety voltage shall be used (24 V).

As a rule of thumb and nail, the following precautions shall be taken about these facilities:

- Both the board and equipment terminals shall be protected with insulating tape;
- The cables that supply power to the equipment and tools shall be provided with protection covers, which shall be of the humidity−proof kind and shall not touch, or be laid, on the floor in passage areas;
- It is strictly forbidden to use cables with bare tips unless properly connected. Plugs should be used;
- All power lines shall be disconnected by switching the breakers off;
- Periodic servicing of all the facilities is essential. This servicing shall be thorough and conducted by specialized personnel;
- Notices shall be used to indicate all electrical risks, as well as the performance of servicing work;
- In case of ongoing electric shock that has not been controlled by switch-breakers, the cable giving electricity has to be disconnected immediately without touching the part of the cable/appliance that is causing the accident.

3.5.2. Load handling.

Load handling implies potential hazards, with high−risk levels for both operators and labor working in the handling area; also, the handled load could get damaged. This activity requires especially trained personnel and lifting/harnessing equipment in mint conditions and adequate for the load to be handled. The basic elements are the load to be handled and the handling operation to be carried out. In function of the load and of the type of handling, you must carry out a careful selection of handling and harnessing equipment.

- ***Load to be handled and handling operation***

- All the selected personnel must know the following load characteristics:
- Typology;
- Weight;
- Centre of gravity;
- Harnessing points.

All the selected personnel must know and evaluate the following details of the handling operation:

- Distance and gradient between harnessing point and landing point;
- Transport route and possible obstacles to overcome;
- A complete view of the operation;
- Difficulties related to final positioning;
- Details of the equipment to be used to move the load.

- **Typology**
  - Typology means the shape and physical characteristics of the load to be handled. The shape can be regular or irregular, and this can imply stability or instability. The shape can have a small or big volume and/or it can be quite long (for ex. piping), and this can make handling easy or hard due to narrow spaces, hindrances, or external actions (for ex. wind). The load physical and characteristics are very important:
  - A fragile solid (for ex. glass) also requires precautions as an accidental bump can damage the entire load;
  - A load placed inside a package also requires precautions; if the materials placed inside are not correctly secured, they can create a displacement of the center of gravity due to oscillation;
  - Flexibility of the materials must be considered.
  - The transport of people using lifting devices is forbidden unless specific qualified equipment (basket)

is used.

- **Weight**

Knowing the weight of the load to be moved is essential. The weight must be recorded on the documents supporting the load or on the product manufacturing drawings. In their absence, it is necessary to assess the weight that must be estimated in excess (For ex. a metal body with a cavity must be evaluated as if it were a full solid).

- **Centre of gravity**

The center of gravity of the load to be handled is a critical element. This element is fundamental also for storage operations (load stability). Depending on where an item's center of gravity is located the item at rest may be in a stable or unstable condition. When the item is to be moved it is important to review the positions of the lifting points about the item's center of gravity.

The center of gravity, if not identified on supporting documents, products, or manufacturing drawings, is quite easy to determine on a regular body, but very hard on irregular bodies or packages that have not been inspected. In such a case, the lifting initial stage is fundamental to identifying the center of gravity (the lifting device hook always tends to position itself in correspondence with the center of gravity).

- **Harnessing points**

In many cases, load feature harnessing points are included during the product design stage, and in such cases, identified during the manufacturing. It is important not to mix these harnessing points with those of the single components forming the product. In other cases, the products have threaded holes for installing eyebolts or shackles: such harnessing points must be included during design and identified on the manufacturing drawings. In many cases, the hook-up man decides the harnessing points, and in this case, the choice must be carried out with extreme attention, and in particular:

- Harnessing points must guarantee a firm hooking and grip also in the event of a bump or loosening of the harnessing equipment;
- The center of gravity must be below the harnessing points;
- The center of gravity must be vertical compared to the lifting hook.

3.5.3. Lifting equipment

Where no particular requirements are specified, the following general safety requirements are considered sufficient:

- All lifting operations must be directed by only a single crane operator standing in a safe position;
- All the lift equipment and means must be following the Ugandan and international law and standards;
- Before starting to use lifting equipment, the SE must ensure that there is no wind speed faster than 40 km/hour;
- Before starting any lifting/translating operation, a sound alarm must be activated to advise all present persons of the beginning of the operations;
- Before starting any lifting activity all safety devices such as limit−switch devices and brakes, must be checked;
- Before every use the lifting device is given a reasonable visual inspection to check that the equipment looks to be in good repair and then every 3 months a more thorough visual inspection is performed for every chain, rope, hook, shackles, brakes, etc.…;
- The lifting means and equipment and materials to be lifted must not be used unless it is of good construction, sound and suitable material, adequate strength, free from patent defect, and properly maintained;
- All the lifting equipment must be tested and examined by or on behalf of the manufacturer or by an authorized person and a certificate of the test and examination specifying the safe working load, signed by or on behalf of the manufacturer or by the authorized person is obtained and kept available for inspection;
- No guards of safety devices shall be disabled or removed.

- All the lifting equipment must be provided with a schedule with a load diagram that shows the load that is possible to lift including safe lifting loads as a function of the length of the boom;
- Use steps and handholds when mounting or dismounting any machine;
- Clean any mud or debris from steps, walkways, or work platforms before using them;
- Always face the machine when using steps, walkways, and handholds;
- Never transport persons inside buckets (unless specifically designed for personnel), on walkways, or platforms;
- Never stand near the operating machine while lifting or transporting materials;
- Drivers and operators must always keep safety belts fastened while operating;

3.5.4. Walking and working surfaces.

Walking and working surfaces shall be kept free of debris and other tripping hazards. Holes and ground openings, such as those created for the casting of foundations, shall be marked with demarcation procedures and material approved by local regulation and customer requirements such as caution tape, flagging, or local material such as thornbushes. This fulfills the goal of stopping intruders, persons, or animals, from accidentally falling into these openings.

3.5.5. Ladders handling

Except where either permanent or temporary stairways, ramps, man hoists, or runways are provided, ladders meeting these requirements shall be used to provide access to all elevations.

Portable Ladders

The design, construction, use, and maintenance of portable ladders shall comply with the next safety requirements for "Portable Wood Ladders", and "Portable metal Ladders".

-Portable ladders used for access in the absence of fixed ladders, these shall be secured against accidental displacement at the top and bottom.

-Portable ladders shall rest on a firm foundation capable of supporting the load without displacement in any direction.

-Ladders shall be equipment with safety shoes, spurs, spikes, tread feet, or other approved slip-resistant devices at the base section of each rail. The devices shall be designed to foundation at the specified angles of inclination and on the type of surface available.

Ladders General Instructions.

-All portable ladders shall be always kept in good condition;

-A competent person shall inspect ladders at intervals not greater than two weeks;

-Any ladder found defective in any way must be returned to the contractor's store and thereafter destroyed.

Use of portable ladders should be restricted to when:

- It is impossible or impracticable to use other, safer means of access;
- Access is required irregularly and for a short term;
- There is only a need for one person at a time to use the ladder;
- There is no need to carry loads exceeding the carrying capacity of one man;
- The ladder is not required to exceed the maximum height of 10 m between landings (in all cases it should be supported to present any undue sagging);
- Ladders must be inspected before use for cracked or split stiles, missing, broken, lost or damaged rungs, and splinters. To facilitate inspection, ladders should be kept free from dirt and grease. Timber ladders must not be painted, but may be treated with a preservative, which does not obscure defects;
- Ladders must be of adequate length to enable them to extend to at least 10 m above the platform or working point unless other suitable handholds are available.

It is dangerous:

- ✓ To use ladders that are too short to provide access and handholds, when work is to be carried out from the ladder;
- ✓ To use short ladders spliced together;
- ✓ To place ladders on insecure supports (loose bricks or other loose packing) to obtain extra height;
- ✓ When using extension ladders an overlap of two rungs is recommended for a length of 5 mand four rungs for a 7 m long ladder.

Note: The use of ladders in a horizontal position as scaffolding is forbidden.

3.6. Work at heights

3.6.1. General requirements

Working at heights represents one of the most critical risks in electrification projects. In addition to work preparations, special PPE shall always be used when conductingany activity under these circumstances. It is working at heights when the work implemented is 2 m or more from the ground level.

- ✓ **Harness**: including hardware must be capable of withstanding a tensile loading without cracking, breaking, or taking a permanent deformation
- ✓ **Lanyard**: The lanyard must be a rope or shock-absorbing web lanyard. The lanyard and all of its components in a fall arrest system must have tensile strength. Locking-type snap hooks shall be used to connect the lanyard to the harness. The lanyard may be retractable allowing freedom of movement but protects the worker should a fall occur. A shock-absorbing lanyard will substantially reduce the force created during a fall. The maximum lanyard elongation when resisting a fall must not exceed 1.06 m in length.
- ✓ **Lifeline:** The lifeline can be horizontal or vertical. Vertical lifelines may only support oneworker.
- ✓ **Rope Grabs:** A person may be connected to a lifeline using a rope grab or by a rope grab and lanyard combination. The lanyard must be less than 1.8 m long to restrict the overall fall to 1.8 m or less. The lifeline size must be stamped on the rope grab, andonly that size and type of line used.
- ✓ **Anchorage:** The strength of any fall protection system is dependent on a secureattachment point.
- ✓ **Rigging**: Anchor points should be as high as possible, but never lower than the connection point on the harness. Workers must be tied off in a manner that ensures no lower level, or other surfaces are struck during a fall

3.6.2. Safety while working at heights and permanent attachment.

OHS staff will train project employees in the hazards and control measures associated with working at heights, will make sure that personnel is permanently attached, and will make maximum use of primary fall protection systems, such as scaffolds, aerial lifts, personnel hoists, etc. The contractor will use safe work procedures and enforce, among others, the following prevention/protection measures:

- ✓ Evaluate all overhead work for fall exposures and pre-plan and install required fall protection systems before assigning the work to employees;
- ✓ Adopt a 100% fall protection policy that makes provision for secondary fall protection for all employees who are working more than 2 m above ground or other solid objects.
- ✓ All fall protection devices will be manufactured and used by a recognizedinternational standard;
- ✓ Review work to identify the methods to achieve 100% fall protection before tothecommencement of such work;
- ✓ Require the inspection of fall protection equipment before each use;
- ✓ Defective equipment will be removed from service and destroyed;
- ✓ Contractor shall ensure that each & every activity has fall protection rescue plan;
- ✓ All lifeline equipment (cable, connectors, supports, etc.) shall be part of the system and willonly be used for fall protection;
- ✓ Ensure that persons working at height will have their safety helmets secured by chin straps to

retain the helmet on the head;

- ✓ Ensure systems are in place to prevent tools, materials, and other objects from falling from height.

3.7. Fire prevention and protection.

Fire protection and prevention shall be followed throughout all phases of the construction anddismantling. This is to be followed by the project team and its subcontractors.

As fire protection requirements occur, there shall be no delay in providing the necessary equipment. The following points are suggested for the prevention of fire.

- Know the place of work, fire hazards, and the location of firefighting equipment;
- Keeps all the firefighting equipment clear of obstructions.;
- Provide easy access to firefightingequipment to save time and minimize any damage due to fire;
- Keep the place of work clean and tidy;
- Do not smoke in 'No Smoking' zones. Do not carry lighted cigarettes hot substances or anysources of ignition where flammable materials are used or stored;
- Avoid the contact of oil, grease, or paint with oxygen cylinders. There may be an explosion due to oxidation;
- Switch off the main supply if electrical equipment is not in use;
- Never throw lighted cigarettes and burning sticks into dust bins, they may ignite and create a fire when you are not there;
- Special purpose electrical equipment shall only be used at storage places for hazardous/flammable material;
- Training will be provided to employees in the proper use of fire extinguishers, fire prevention,and fire precautions.

3.8. Site roads and transport of material

One ne of the first causes of injuries on site is vehicular accidents. Site roads shall be:

- Wide enough to allow the free circulation of the vehicles in both ways. In case the ground morphology does not permit the realization of a double-way road, then lay−by shall be foreseen;
- Maintained always in good condition, clean of mud and free stones, and free of holes;
- Speed reducers like bumps or trenches shall be done across the roads before dangerous curves, bottlenecks, or dangerous areas; this procedure shall follow the Traffic rules of the Project.

The following rules shall be followed inside the site area:

Maximum speed for all the vehicles shall be fixed unless otherwise specified in the traffic management rules:

- 50 km/h on-site roads;
- 30 km/h in the proximity of working areas;
- Overtaking between trucks in busy work areas is not allowed;
- Any vehicle descending a downhill road shall give way to the one rising.

Outside the project area, the country traffic rules shall be respected. Anyone found not respecting the above rules will be subject to disciplinary measures.

3.8.1. Work on roads.

Most of the project work will be done closer to the local roads. Risk shall be assessed before the start, and a written method statement submitted to the project manager or site manager for approval. The method statement shall detail controls including, speed restrictions, warning signs and cones, barriers, and type. Where significant risk of traffic collision vehicle blocks shall be used. Under specific circumstances, in case of an existing overhead crossing of a conductor above a road, adequate scaffolding shall be installed based on EDCL's best practices.

3.8.2. Driving, traffic, and transport Safety

Driving and traffic are regarded as the most dangerous part of the job, not only because of the potential bodily injuries but also because of the high frequency of occurrence. To minimize the impact and frequency of occurrences, the next guidelines are to be followed. Make sure all cars and trucks are equipped with working safety belts in all seats.

- ✓ Seat belts must be used all the time;
- ✓ All vehicles should be equipped with a first aid kit and fire extinguisher;
- ✓ Monthly inspections of vehicles including General, Fluids, Lights, and Safety.
- ✓ Do not drive if you are tired;
- ✓ Separate bags and boxes from passengers;
- ✓ Do not engage in reckless driving and do not exceed the speed limits;
- ✓ Do not use the mobile phone while driving, not to make calls, nor for texting;
- ✓ Being intoxicated when driving or operating machinery will lead to dismissal;
- ✓ Make inspections of cars, trucks, and driving behavior part of all safety walks;
- ✓ Minimize driving in the dark.

3.8.3. Heavy motor vehicles

Heavy motor vehicles are intended to be used mostly at the project sites to transport project materials including transformers and poles. Specific competency is needed to operate heavy motor vehicles, as well as adequate training and a fit-for-purpose driving license. In addition to this, some requirements are needed to make the project utilization safe:

- ✓ Heavy construction equipment should have a reverse signal alarm;
- ✓ The reverse alarm should be checked, and defective alarms will be replaced;
- ✓ A flagman, warning signs, or other controls will be provided when operations or equipment on/or adjacent to street traffic create a traffic hazard;
- ✓ All drivers must always keep valid Driver Licenses;
- ✓ Seat belts shall be always worn when in vehicles;
- ✓ The speed limits shall be strictly observed;
- ✓ Traffic violations beyond a simple speeding ticket shall be reported to your supervisor;
- ✓ Before loading, unloading, or conducting any activities around a vehicle, the vehicle shall be placed in park or gear, the vehicle shut off, and the parking brake set;
- ✓ On inclines, vehicles shall be choked, and the wheels turned into the curb;
- ✓ When being loaded or unloaded by a fork truck or other piece of equipment, the vehicle wheels shall be checked to ensure that no movement occurs;
- ✓ Passengers are not allowed to ride in the back of pickup trucks together with bags or boxes;
- ✓ Riding as a passenger on any equipment is prohibited unless the equipment has the safe capability of transporting personnel and was intended for such use.

3.8.4. Light vehicle operations

The following rules concerning vehicles will be implemented:

- ✓ Only licensed drivers shall be allowed to operate vehicles;
- ✓ Seat belts shall be always worn when in vehicles;
- ✓ The speed limits shall be strictly observed;
- ✓ Before loading, unloading, or conducting any activities around a vehicle, the vehicle shall be placed in park or gear, the vehicle shut off, and the parking brake set.
- ✓ When being loaded or unloaded by a fork truck or other piece of equipment, the vehicle wheels shall be checked to ensure that no movement occurs.

3.9. Housekeeping, Tools, and equipment handling

3.9.1. Housekeeping

Good housekeeping practices will be maintained on all work sites. Before leaving for the day, personnel will ensure that all equipment is secured, trash and debris are removed from the site, and adequate safety

indications are installed to avoid harm to members of the public. The foreman must conduct a final walk-through of the job site before leaving to inspect for anytripping, foot penetration, or fire hazards.

All personnel's eating and sanitary facilities will always be maintained in a clean and sanitary condition. contractors will provide the necessary resources to accomplish this, including adequate washing facilities unless mutually agreed with the subcontractors. In this case, contractors will ensure that sub-contractors fulfill adequate requirements.

3.9.2. Slips, trips, and falls

Site personnel will ensure that any instances of poor housekeeping resulting in the creation of tripping, slipping, or other hazards are corrected immediately. It will be ensured that work areas are orderly and regularly maintained. They will be maintained clear of debris, waste, and other rubbish. To minimize any incidents to bystanders, site personnel shall identify work areas through clear demarcation signs to avoid access to restricted zones:

3.9.3. Tools and equipment

To ensure a safe operation, the following guidelines are described:

- ✓ All tools are used by the manufacturers' recommendations; have required guards in place; and, are maintained in good working order as per manufacturer's recommendations;
- ✓ All vehicle/equipment operators are competent and licensed;
- ✓ All equipment used follows certification and legislation requirements;
- ✓ Powered tools and equipment will only be used by operatives trained in their use;
- ✓ Tools and equipment have been inspected before use on-site, including hired tools and equipment. The inspection shall be carried out by a competent person. For electrical tools this will be done by a qualified electrician;
- ✓ Major equipment is individually numbered, labeled, and registered;
- ✓ No modified equipment is brought on-site unless the modification has been approved by a competent person (i.e. typically the equipment supplier or vendor or an engineer);
- ✓ Inspection systems meet the manufacturer's or supplier's specifications.

Heavy equipment shall be thoroughly inspected before use. The foreman will inspect the equipment, using an approved checklist, when the equipment is first placed at the job site and whenever the equipment is demobilized and successively placed back on the job site.

All repairs on machinery or equipment shall be made at a location that will ensure the safety of the mechanics, e.g. heavy machinery, equipment, or parts thereof that are suspended or held apart by the use of slings or jacks shall also be substantially blocked or cribbed before personnel are permitted to work underneath or between them.

Any guard or safety device removed or made ineffective for any piece of equipment used at the site or during repair or maintenance shall be replaced or restored to safe operation condition, immediately after completion of the repair that requires its removal.

3.9.4. Hazard material awareness

Whenever in use of hazardous materials and chemicals, the following measures will be adopted:

- ✓ Material containers will be labeled as to contents and hazards;
- ✓ Material Safety Data Sheets will be available, on-site, for review by employees;
- ✓ A Material Safety Data Sheet will be on-site before any hazardous material is brought onto the job site;
- ✓ All employees shall be trained in the recognition, proper handling, and use of hazardous substances;
- ✓ Product containers are to be properly labeled.

3.10. Alcohol and Drug Control Plan

The consumption of alcohol and drugs in the workplace can cause changes in the behavior ofworkers (loss of concentration and reaction time) and lead to situations of risk with disastrous consequences for the workers and their companies.

As the construction activity is considered high risk, is of particular importance to preventing and controlling alcoholism, to increase the quality of life of employees and the contractor's performance.

The consumption of alcohol and drugs on the work site during working hours is strictly prohibited. Information sessions will be held to prevent hazards caused by the consumption of alcohol and drugsIt is also prohibited to perform any work whilst affected by alcohol or drugs.

Smoking is prohibited on-site or at any project office or project location.

4. TRAINING AND COMPETENCY

4.1. General Requirements

EPC contractor and subcontractor will undertake internal training and education activities to ensure that Project expectations regarding Occupational Health and safety are achieved. In addition, the Project will guide contractors regarding expectations for Occupational Health and Safety training, education, and competencies. Occupational health and safety competencies will be appropriate to the respective parties' scope of activity and level of responsibility. The project will undertake an initial evaluation of training needs associated with this OHS and, on this basis, develop and maintain an OHS training matrix.

The Project's Occupational health and safety training will include several levels of competency, depending on everyone's level of involvement and responsibility:

- **Induction Training and Awareness**: this training will be for visitors or individuals who do not have direct roles or responsibilities for implementing the OHS and will cover basic Project environmental and social commitments.
- **Management Training and Awareness**: this training focuses attention on management; covering key aspects of the OHS and providing an overview of the Project's environmental and social impact management expectations and the supporting processes and procedures prescribed in the OHS plan to meet performance expectations.
- **Job-specific Training and Awareness**: job-specific training will be provided to all personnel who have direct roles and responsibilities for implementing or managing components of the OHS. This training will also include all people whose specific work activities may have an environmental or social impact.

4.2. General training and induction

4.2.1. Induction Training

All newly recruited employees and visitors shall have to undergo induction training before the commencement of any work activity with the contractor. Workers shall receive this competency training depending on the nature of the activities they shall execute. In these training courses, the recruits shall be introduced to the company safety rules and regulations. Note also that sub−contractor and their employees shall be inducted. All trained personnel must sign against their names to confirm their attendance.

4.2.2. Safety meetings / Pre-job briefings

A preliminary meeting for initial safety induction will be held with the Project Manager, Site Manager, Site Supervisor, and Foremen. All of these have the responsibility to maintain the OHSP activities implemented on-site to achieve the Zero Accident goal. All site meetings will have OHSP as a first item on the agenda, covering both general aspects andthose that need highlighting at the time of the meeting.

Additional meetings will be held by the Site manager or project manager, both with assigned OHSP functions when operations with increased risks or the follow-up of near-miss incidents make such meetings necessary. Minutes of the Meeting will be issued. Pre-job Briefings shall be held regularly, depending on the size and complexity of activities at the construction site.

The responsible will ensure the Job Hazard Analysis and Toolbox meetings are regularly implemented for each daily work assignment.

4.2.3. Toolbox talks

Toolbox talks communicate the risks identified for project activities and daily work including potential hazards associated with performing such a job. The toolbox talks are complemented by the job hazard analysis which serves as guidance for daily activities.

Toolbox talks are conducted daily and led by site managers, site supervisors, foremen, or team leaders, upon availability. The end objective is to make the team members aware of potential hazards on that specific day to avoid accidents on site. In addition to the informative nature of the talks, they empower employees to identify and discuss specific hazards and protective measures associated with the assigned work. Project managers and site managers will ensure employee involvement in the toolbox talks. This process is mandated by EDCL's policy but is not required to be documented.

4.2.4. Safety operation and training

All personnel appointed to work on-site will have the necessary knowledge, experience, and training tocarry out the duties assigned to them. This is ensured and reinforced through the Toolbox talks. All members of staff involved in tasks that require special knowledge are experienced and qualified.

4.3. Competency training

This training will be provided to all contractors, subcontractors, and employees. Those responsible for performing site inspections will receive training by drawing on external resources as necessary. Upon completion of training and once deemed competent by management, staff will be ready to train other people. The Project will require each contractor to institute training programs for their personnel. All contractors and their subcontractors will be responsible for implementing relevant and adequate training programs to maintain the required competency levels. Contractor training programs will be subject to approval by Project Management and will be assessed to confirm that:

- training programs are adequate;
- all relevant personnel have been trained; and
- Competency is achieved.

Contractors will be required to report on their training activities, and the Project will maintain records of all training delivered.

Table 31: OHS training plan;

Training course	Unskilled labor	Skilled labor	Frontline supervisors	Middle management	Senior manager	Drivers	Safety men
Intro to the OHS	x	x	x	x	x	x	x
Emergency response	x	x	x	x	x	x	x
Hazards& controls			X	*	*		
Foreman responsibilities			*	x	x		
Managing safely			x	*	*		
Managing rule-breaking				*	*	x	
Fire prevention	*	*	x	x	x		X

Training course	Unskilled labor	Skilled labor	Frontline supervisors	Middle management	Senior manager	Drivers	Safety men
First aid	*	*	*	*			
Confined space entry	x	x	x	x	x		
Back safety/ lifting safety	x	x	x	x	*		
PPE	x	x	x	x	x	x	X
Fall protection		*	*	*	*		
Small/ power tools		*	*	*	*		
Hand Safety	x	x	x	x	x	x	X
Scaffold construction			x	x	x		
Forklift operations	x	x	x	x	x		
Hazard recognition	x	x	x	x	x	x	X
Excavation safety			x	*	*		X
Health& hygiene	*	*	x	x	x		X
Environmental awareness	x	x	x	x	x		X
Ladder safety	x	x	x	x	*		*
Excavation safety	x	x	x	x	*		X
Risk assessment		x	x	x	x		*
Hazard registers				x	*		
Lifting operations		x	x	x	*		
Safe use of chemicals	x	x	x	x	*	x	X
Accident prevention	x	x	x	x	x	x	X

Key: x= compulsory

***=selected personnel**

Each training will be provided by a qualified expert hired by a contractor. The number of people to be trained for each topic will be known after the recruitment of workers and screening to define the training appropriate for each category depending on their expertise and knowledge.

5. ACTIVITY-BASED PREVENTION PLAN FOR TRANSMISSION AND DISTRIBUTION LINES

5.2. Foundation works, excavation, and trenching

5.2.1. Excavation safety plan

This excavation safety flan has been developed to protect employees from safety hazards that may be encountered during work in trenches and excavations. This program is intended to ensure that:

- ✓ Employees who perform work in excavations are aware of their responsibilities and know how to perform the work safely.
- ✓ All persons involved in excavation and trenching work will receive appropriate training in the safe work practices that must be followed when performing this type of work. The project manager shall ensure that:
- ✓ The procedures described in this plan are followed.
- ✓ Employees entering excavations or trenches are properly trained and equipped to perform their duties safely.
- ✓ All required inspections, tests, and recordkeeping functions have been performed.
- ✓ All employees who work in or around excavations, must comply with the requirements of this plan.

Employees are responsible for reporting hazardous practices or situations to the Supervisor/Foreman, as well as reportingincidents that cause injury to themselves or other employees.

The site manager will ensure that whenever an excavation operation is being undertaken, work practices and proper conditions are met before beginning, during, and after such excavation operations. Employees will cease operations if there is a question regarding a hazard or ifsuch is suspected or discovered.

No employee is permitted underneath loads being handled by lifting or digging equipment. Employees are required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles provide adequate protection for the operator during loading and unloading operations.

5.2.2. PPE during foundation works

All employees working in excavations shall wear PPE. Employees exposed to flying fragments, dust, or other materials produced by drilling, sawing, sanding, grinding, and similar operations shall wear safety glasses with side shields and mouth covers. Employees using or working near hammer drills, masonry saws, jackhammers, or similar high-noise-producing equipment shall wear suitable hearing protection. Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function.

Manufactured materials and equipment used for protective systems will be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards. When material or equipment that is used for protective systems is damaged, the Contractor's competent person will examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment can support the intended loads or isotherwise suitable for safe use, then the material or equipment will be removed from service and will be evaluated and approved by a registered professional engineer before being returned to service.

5.2.3. Protection from water accumulation hazards

Employees are not permitted to work in excavations that contain or are accumulating water unless precautions have been taken to protect them from the hazards posed by water accumulation. If water is

controlled or prevented from accumulating using water removal equipment, the water removal equipment and operation shall be monitored by a person trained in the use of that equipment.
If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation.

Precautions shall also be taken to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains shall be re-inspected after each rain incident to determine if additional precautions, such as special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water or use of safety harnesses and lifelines, should be used. The site supervisor shall inform affected workers of the precautions or procedures that are to be followed if water accumulates or is accumulating in an excavation.

5.2.4. Protection of the public

Barricades, walkways, lighting, and posting shall be provided as necessary for the protection of the public before the start of excavation operations.

5.3. Poles erection protection plan and working at height.

5.3.1. Poles Erection Plan

This Erection Protection Plan has been developed to protect employees from safety hazards that may be encountered during erection works and the use of heavy machinery like cranes. All employers involved in pole erection works have complete knowledge of pole election. This plan is intended to ensure that:

- ✓ control, before starting work, the efficiency of tools, equipment, lifting slings, equipment,
- ✓ PPE use and safety equipment;
- ✓ call the attention of the operator on the ground before starting the movement;
- ✓ proper locking of the support/implementation of the vehicle with ropes;
- ✓ appropriate locking and stability of the hold of the supports on the ground;
- ✓ controlling the visibility from the driving position of the crane over the entire work area (with coordination between crew and crane driver) with particular attention to the position of the vehicle concerning the land slopes and visibility;
- ✓ ban on driving under suspended loads;
- ✓ adequate stabilization of the crane;
- ✓ immediate application of the sling above the center of gravity;
- ✓ use of wooden beams to store backup elements or support sections preassembled;
- ✓ use of signs and red flags protruding loads into the ends of the poles;

5.3.2. Safety while working at heights and permanent attachment.

The health and safety manager will train project employees in the hazards and control measures associated with working at heights, will make sure that personnel is permanently attached, and will make maximum use of primary fall protection systems, such as scaffolds, aerial lifts, etc. The contractor will use safe work procedures and enforce, among others, the following prevention/protection measures:

- ✓ Evaluate all overhead work for fall exposures and pre-plan and install required fall protection systems before assigning the work to employees;
- ✓ Adopt a 100% fall protection policy that makes provision for secondary fall protection for all employees who are working more than 2 m above ground or other solid objects.
- ✓ Review work to identify the methods to achieve 100% fall protection before the commencement of such work;
- ✓ Require the inspection of fall protection equipment before each use;
- ✓ Defective equipment will be removed from service and destroyed;
- ✓ Contractor shall ensure that each & every activity has fall protection rescue plan;
- ✓ All lifeline equipment (cable, connectors, supports, etc.) shall be part of the system and will only

be used for fall protection;

- ✓ Approved safety harnesses are to be used for employees.
- ✓ Ensure that persons working at height will have their safety helmets secured by chin straps to retain the helmet on the head;
- ✓ Ensure systems are in place to prevent tools, materials, and other objects from falling from height.

5.4. Stringing works

Employees shall not be permitted under overhead operations or on cross-arms while a conductor or pulling line is being pulled (in motion).

A transmission clipping team shall have a minimum of two structures clipped between the team and the conductor being sagged. When working on bare conductors, clipping teams shall always work between earthing equipment; the earthing equipment shall remain intact until the conductors are clipped in, except on dead-end structures. Reliable communications between the reel tender and pulling team shall be provided, e.g. VHF or similar radios. Each pull shall be dead-ended at both ends before subsequent pulls.

5.5. Stringing protection plan

This stringing (ending with sagging and regulation) protection plan has been developed to protect employees from safety hazards that may be encountered during work. All employers involved in stringing work know their role in the process and pay attention to the instruction they receive continuously. This plan is intended to ensure that:

- Control before the work of grounding and safety of power lines interfering with line of work andequipment;
- Use of PPE to climb and work on supports, special awareness of permanent attachment;
- Call the attention of the operator to the coil and wait for your consent before starting thestringing of conductors;
- Use of one radiotelephone for operators at the puller, and at any location deemed as acting as obstacles to the signal;
- Placement of scaffolding in the case of crossing facilities, roads, housing, etc;
- Use of lifting equipment and accessories (ropes, slings, hooks, etc.) loads adapted to their capacities;
- Use of adequate means for their characteristics;
- Use of service ropes to provide the operator with tools and materials required;
- Check the stability of supports before climbing and using any bracing;
- Use carrying bags to store tools when working in a high position;
- Before starting the stringing operation briefing on the work phase shall be performed;
- All personnel involved have to be continuously in radio contact.
-

5.6. Earthing

When earthed, new lines or equipment may be considered de-energized and worked upon as such. Earthing should be applied in all cases, even when the hazard of induced voltages is not present and adequate clearances or other means are implemented to prevent contact with energized lines or equipment. Earthing equipment shall be placed upstream and downstream of the working location of the transmission line.

Earthing equipment may be temporarily removed only when necessary for test purposes and caution shall be exercised during the test procedures. The lines or equipment from which earthing equipment has been removed shall be considered energized due to induction current.

An earthing device shall be installed between the tensioning reel setup and the first structure, e.g. tubular pole. The earthing device shall be installed at each conductor, ground wire, or OPGW during stringing

operations. During stringing operations counting from the first structure, each bare conductor and overhead ground wire shall be earthed starting from the first pole adjacent to both the tensioning and pulling setup.

5.7. Barricades and traffic control plans

The contractor will properly erect and maintain barricades and barriers in such a manner that they provide adequate protection. Barricades and barriers erected will have appropriate signs and tags indicating the nature of the hazard and the responsible supervisor. Barricades left after dark on or near roadways will be properly equipped with flashing amber lights.

The contractor will provide and use appropriate barrier devices to identify the nature of the job hazard involved (i.e., yellow and black for "CAUTION" or red and black for "DANGER"). Barrier devices, including barrier tape, will not be used as a substitute for a barricade as they do not offer adequate protection from falls. Barrier devices will be used only in those applications where temporary identification of a hazard is needed; but not as a primary means of protecting employees from exposure. It will be ensured that employees understand and comply with barricade and barrier procedures (i.e. prohibited entry into red barrier taped areas). Where hazards are expected to exist for more than 24 hours (e.g., excavations), it will be ensured thata physical barricade is erected using wooden, mounted plastic or metal guardrails.

The contractor will ensure that barricades are complete (i.e., the work area is entirely isolated and identified). The barricaded area will be of sufficient size to afford appropriate protection. It will be ensured that required safety signs will be posted (e.g., prohibition signs, warning signs, mandatory action signs, fire safety signs, etc.).

6. EMERGENCY PREPAREDNESS REQUIREMENTS

6.2. Initial actions

First Aid is defined as:

- ✓ Treatment to preserve life and minimize the effect of the injury/illness, until the arrival of paramedic assistance via the Emergency Services;
- ✓ Treatment of minor injuries that would otherwise receive no treatment or are not sufficiently serious to require the services of a medical practitioner;
- ✓ first aid aims to reduce the effects of injury or illness suffered at work. It does not include giving medication.

6.3. Emergency procedures

The general procedures applicable in emergencies must be followed to implement the appropriate response against unexpected events that may injure people and/or goods. The measures to be followed are described in the table below:

INCIDENT WITH NO PERSONAL	INCIDENT WITH LIGHT PERSONAL	INCIDENT WITH SERIOUS PERSONAL INJURY
Report to supervisor; **Restore** all working and safety conditions.	**Report** to supervisor; **Provide** first aid and send the injured to the Hospital; **Restore** all working and safety conditions.	**Report t** o supervisor; **Provide** first aid; In case of emergency communicate with external means of relief for intervention; Indicate the correct location and number of victims

The contractor will implement procedures and will provide all emergency equipment and supplies needed to support the work and each work location. The enclosure above illustrates the procedures and guidelines in case of an accident. This documentation must be complete for each line.

6.4. Notifications procedure

Serious incidents will be reported to the Engineer promptly and accurately. The incidents involving employees, subcontractors, and/or property will be properly investigated to determine the causes and the corrective measures necessary to prevent their recurrence. For serious incidents, a complete incident report will be filled out.

Near misses that had the potential to have resulted in an injury, fire, spill, motor vehicle accident, or other incident will be investigated, and corrective measures will be taken.

6.5. Emergency equipment and tools

6.5.1. First aid kit

All construction sites shall have first aid kit stations. Also, each vehicle, including Contractors' vehicles, shall have a first aid kit. The first aid kits should contain the following material:

- Material Containment;
- Betadine Solution Dermal;
- Sterile compresses;
- Bandages;
- Adhesive Anti-Allergic;
- Quick dressings;
- Saline solution;
- Scissors with curved tips;
- Sterile Gloves.

6.5.2. Fire extinguisher.

Fire extinguishers will be provided and suitably located, distinctly marked, readily accessible, and maintained in a fully charged and operative condition.

Inspections should be recorded on the inspection tag attached to each extinguisher or on a log documenting the extinguisher's location and/or number.

Work areas shall be kept free from combustibles and flammable liquids. Fire extinguishers shall be provided by the contractor for hot work and any use of flammable or combustible liquids. All flammable liquids shall be stored in approved Flammable Liquid Storage Cans. Only the quantity necessary for the job should be present in the work area. The site manager shall ensure that the proper number and location of fire extinguishers are present for any occupancy or type of work.

6.6. Medical Emergency Response Procedures

Stage 1: In the event of Serious injury or illness

- ✓ Stay calm – Assess the situation and make the area safe before attempting any rescue. Do not endanger yourself.
- ✓ Take control of the situation – Immediately call for assistance, and safeguard against further danger to others if possible. If there are victims, and if the scene is immediately life-threatening to them, it may be necessary to remove them from danger before attempting first aid. If no life threat is present, do not move the victim until the condition is known to be safe to move or instructed by the paramedic.
- ✓ Preserve life – If you can give First Aid without risk of injury to yourself or the patient – begin treatment. If not, contact the nearest source of medical attention, either a trained first aider nearby or the project paramedic. In either case, control bleeding and reassure the victim that everything is under control until help arrives.
- ✓ Get assistance – The first person present at the scene must inform the Site Manager, who has the overall OHSP responsibility, giving the following:
    1) Location of injured personnel;

2) Name and number of injured persons;
3) Nature of injuries;
4) Brief description of what has happened.
5) Details of any resources already near the scene, such as first aid personnel, ambulance, etc.

✓ After receiving the emergency call from the scene, The Site Manager will inform the following personnel:

1) Paramedic;
2) Ambulance driver.

The Paramedic/ Site Manager will advise personnel at the emergency scene about what action is to be taken and determine if a medical evacuation will be necessary.

If no further treatment or action is necessary, this procedure will end. If a medical evacuation is required, Stage 2 will be implemented immediately.

When a working site is too far from nearby medical facilities site personnel with medical experience or training will be located at the site and equipped with a vehicle to transport theinjured to a medical facility.

Stage 2: When a medical evacuation is required.

The Paramedic/The Site Manager monitoring the situation will determine the type and method of evacuation to be conducted, and to which destination the injured/ill person should be evacuated. The degree, severity, and nature of the injury or illness will be the sole basis for his decision. Casualties with suspected fractures of the Skull, Spine, or Upper Leg(s) are in severe danger. They are NOT to be moved until the paramedic arrives at the scene UNLESS a further life-threatening condition exists, such as loss of limb, heart attack, head injury, internal bleeding, etc.

Authority Limitations *the Paramedic and Site Manager are authorized to take any actions involving expenditures for REG/ EDCL in connection with the emergency or incident that are judged essential to save life or to relieve suffering.*

Stage 3: - Evacuation

✓ Ambulances are to proceed on instructions to the nearest safe and accessible point waiting for the patient's arrival.

✓ Field first aiders will proceed on foot if necessary to the accident site with all necessary equipment for patient stabilization.

✓ Other work groups near the site of the incident are to stop work if necessary and assist medical personnel in case stretcher carriers etc are required.

✓ If the patient can walk or be moved safely by his companions they are to make their way towards the ambulance.

The situation will continue to be monitored by the paramedic / Site Manager.

The ambulance will proceed with the patient straight to the closest clinic if deemed necessary. Care will be taken to avoid causing further injury or discomfort to injured personnel when driving over rough terrain.
In all cases where evacuation is needed, the injured/ ill person will be transferred to the closest clinic.

6.7. Fire Response Procedures

Early detection

- By personal vigilance
- Prompt reaction.
- By shouting "Fire, Fire, Fire!"

Immediate response

- Call 911 or the local emergency number;
- By using the nearest suitable firefighting equipment;

- By accounting for all personnel (Head Count).

6.8. Site Waste Disposal & Management

Bins will be provided at convenient intervals for disposal of waste within the construction site Bins should have liner bags to allow for efficient control and storage of waste and prevent leak of material from waste containers.

Provision of separate waste receptacles for each waste will be required. Where possible recyclingshould be encouraged. Mixing of hazardous and non-hazardous waste will not be permitted.

Proper storage facilities shall be provided before the start of construction activities and will be distributed at theconstruction site areas. Liquid and hazardous waste must be stored in a fenced area on a hard surface and under cover. Storage facilities will consist of designated areas with sufficient provisions and/or containers with lids will be used for litter collection and storage on site.

Littering on site is strictly forbidden and the site shall be cleared of litter at the end of each day.

6.8.1. Non-hazardous waste

All waste will be removed from the site and transported to an approved disposal area. A certificate of safe disposalwill only be required for hazardous waste; however, it must be demonstrated that the waste has been taken to an approved landfill. Construction rubble shall be disposed of at an approved disposal site and may not be buried on site.
Care to be taken to avoid contamination of soil and water and nuisance to adjoining areas.

6.8.2. Hazardous waste

Hazardous waste disposal such as defective transformers shall be carried out by an approved waste contractor. A certificate of safe disposal is to be provided to the Site Manager. The disposal site must be classified for the class of waste being taken there.

All collected hazardous waste will be placed into the containers to prevent the likelihood of exposureduring handling. All vehicles, reusable containers, and covers that have been in contact with hazardous waste must be cleaned and decontaminated after use in such a way that the vehicle, container, or covers do not cause a hazard inside and outside the campsite. All employees involved in the collection, transport, and disposal of Hazardous substances are to be providedwith suitable personal protective equipment.

6.REPORTING AND DOCUMENTATION

6.1. Reporting and monitoring

This section outlines the reporting and notification associated with the implementation of the OHS plan. The Project and contractors will work closely together to identify and agree to all such Project notification and reporting requirements. It is envisaged that reporting will cover at least the following areas:

6.1.1. Contractor Monthly Reporting

Contractors will work closely with the Project before the commencement of work to define the structure, content, and format for their environmental and social monthly report. This report will contain key information about the contractors' implementation of the environmental and social requirements and mitigation measures and will cover, among others:

- environmental and social assessment and improvement findings;
- incident notifications;
- non-conformity/non-compliance and corrective actions;
- key performance indicators;
- details of any environmental or social surveys or studies; and

- Environmental and social training conducted.

6.1.2. Quarterly Reporting

The Project will prepare and submit to the relevant government departments a Project Environmental and Social Quarterly Report. The structure, content, and format will be agreed upon with the government before the commencement of work. This quarterly report will document key information on the Project's performance against the OHS requirements.

6.2. Managing Changes

Changes in the Project may occur due to unanticipated Project developments. This OHS plan, for example, is being undertaken before the completion of the design stage of the Project. Wherever possible, the environmental, social, Health, and safety mitigation measures should be updated depending on final designs. As the project planning progressed, certainty regarding the nature and magnitude of impact sources became clearer to the Project and the relevant changes should be made in the ESMP, and OHS plans. Adaptive changes may also occur during Project commissioning and operations. The Project will implement a formal procedure to manage changes that will apply to all Project activities. The process for dealing with Project changes and uncertainty recognizes three levels of change/uncertainty:

- **Level One: Minor Significance,** where the change or uncertainty is largely deemed to be immaterial to the OHS findings and does not affect the Project's ability to meet environmental and social performance requirements outlined in the OHS. This change may require additional but limited environmental or social study or survey activities.
- **Level Two: Moderate Significance,** where the change or uncertainty is deemed to be material to the OHS findings but is within the boundaries of the defined Project base case covered by the OHS. This may require minor changes to the OHS and additional surveys or environmental and social assessments.
- **Level Three: Higher Significance,** where a future significant change or uncertainty leads to a departure from the base or a key aspect of it. An addendum to the ESMP/OHS plan, or a new OHS and formal submission and approval process, is then required.

6.3. Documentation and document control

The abovementioned process will ensure that the Project can adapt to changes whilst meeting the relevant environmental and social performance requirements. In its OHS report, OIA will include the following documentation:

- environmental and social policy, objectives, and targets;
- description of the scope of the OHS plan;
- description of the main elements of the OHS plan and their interaction, and reference to related documents;
- documents including records consistent with the requirements of lenders; and
- Documents, including records, determined by the EPC contractor to be necessary to ensure the effective planning, operation, and control of processes that relate to its significant environmental and social aspects.

6.4. Control of Documents

Documents required by the OHS plan will be controlled by the EPC Contractor and will establish, implement, and maintain procedures to:

- approve documents for adequacy before issue;
- review and update as necessary and re-approve documents;
- ensure that changes and the current revision status of documents are identified;
- ensure that relevant versions of applicable documents are available at points of use;
- ensure that documents remain legible and readily identifiable;
- ensure that documents of external origin determined by the organization to be necessary for the planning and operation of the OHS Plan are identified, and their distribution controlled

(*e.g.,* government guidance, permits); and

- Prevent the unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

7. STAKEHOLDERS ENGAGEMENT AND GRIEVANCE MECHANISM

This section of the OHS Plan provides an overview of implementing entity plans and commitments to provide ongoing opportunities for stakeholder and community engagement while implementing the electrification project. It also provides plans to advance sustainability initiatives during Project Construction and Operation and through Decommissioning. The objective of this engagement is to:

- identify parties with an interest in the Project, understand their interests and concerns, and ensure opportunities for their participation;
- build long-term and mutually-beneficial relationships;
- establish effective communication processes;
- allow for meaningful input into the Project planning, design, and development activities; and
- Ensure effective tracking and documentation of engagement activities and issues.

7.2. Engagement Dimensions

There will be several dimensions of the engagement program as described below.

- **Site committee**

A key component of the engagement program will be a field team that will collaborate with nearby communities, local authorities, affected Persons, and perhaps other stakeholder groups for the engagement committee. The purpose of the Committee is expected to be to:

- disseminate and discuss information about Project activities;
- provide community review of environmental monitoring and performance of the Project;
- provide a forum for the exchange of information and discussion regarding issues they arise, and for developing effective means for addressing such issues.

- **EPC contractor offices**

Furthermore, During Construction, there will be significant interest in the on-site activities as well as business, contracting, and employment opportunities. OIA has established a temporary office in the project and another office in Kigali. These offices provide information on the Project, answer questions, and collect any comments or questions from members of the public. This office will provide the public with information about employment, procurement, and contracting opportunities.

- **Site Tours**

During the Construction and Operation of the Project, the Contractor will provide guided tours (pre-arranged) and conduct open houses at key milestones to keep the public informed about the Project.

- **Presentations and Meetings**

As appropriate, the contractor will conduct meetings and presentations of the Project and updates to some individuals, stakeholder groups, individuals representing stakeholder groups, business groups, and federal, provincial, and District officials.

- **E-mail and Phone calls.**

The contractor will explore the possibility of creating a project Email and provide phone contact that can be used by stakeholders to express their views, and concerns, and request information.

7.3. Communication

The Contractor shall implement communication mechanisms to ensure that all internal and external stakeholders are made aware of OHS hazards that may affect their health and welfare.

Methods used to communicate OHS hazards on the project shall include:

- Toolbox talks;

- Pre-work briefing;
- Safety messages of the week;
- Safety alerts;
- OHS and other project meetings;
- OHS training including OHS induction;
- Site posters, noticeboards, and signage.

7.4. Participation and consultation

To ensure that all project stakeholders are invested in OHS management, the following key OHS procedures mandate the active participation of, and consultation with multiple internal and external stakeholders (as required):

- Environmental aspects& impacts;
- Internal audit;
- Emergency preparedness& response;
- Hazard identification& risk assessment;
- Incident report& investigation –HSE;
- Legal HSE and other requirements;
- Management review;
- Method statement development;
- Monitoring HSE performance;
- Organization objectives;
- Permit to work;
- Internal and external project communications;
- Pre-work briefing.

Additional participation and consultation methods employed on the project shall include:

- Establishment of a project OHS committee;
- Open door policy of all management;
- Continuous improvement and lessons learned submission;

7.5. Grievance Mechanism

EPC contractor together with stakeholders will establish and implement a Grievance Procedure based on existing structure in the project's areas. The GRM includes all stakeholders such as representatives of affected communities, local authorities, and contractor and Client staff. The establishment of GRM considers both Men and Women, youth and vulnerable people. The Grievance Procedure describes how community members can raise grievances regarding the Project's activities. The Grievance Procedure addresses verbal or written grievances, which must include sufficient information about the complaint or claim so that a proper and informed evaluation of the grievance can be made. When a grievance is filed, it will be logged and evaluated. All grievances will be tracked for monitoring and reporting purposes and to ensure timely and proper resolution. The OHS Officer serves as the project liaison person for GRM and coordinates with the GRM committee and Local authorities.

The GRM will be made by:

- EDCL/RUEAP safeguards team;
- District representatives (land officer/in charge of infrastructure and district environment officer);
- PAPs representatives (Women and Man);
- Contractor OHS PLAN specialist.

For complaints that are not solved by this committee then, the case will be referred to the existing administration structure up to the relevant court.

The first level of the Grievance redress mechanism is the GRM committee and if the complainant is not satisfied, they can appeal to their local leadership starting at the Cell level, then the Sector, and finally the district leadership. If the grievance is not resolved via the local leadership structure, the complainant's final resort shall be to file the case with the competent Court of Law. To ensure that the affected parties are fully aware and to reduce the possible backlog of complaints, it should be noted in advance that most members of the rural communities take time to decide to complain within the 30 days required to file their complaints. As per international standards, grievances logged outside this timeframe may still be valid and legitimate. Customarily, the government authorities ensure that all affected people are fully informed and will issue warnings about the consequences of failure to lodge their complaints in time. Within this customary procedure, affected people will be informed of the procedures during public consultation. EDCL will follow up with the aggrieved PAP at each level to ensure that the grievances are resolved.

8. CONCLUSION

The implementation of the planned projects in the Northenprovince has social and economic benefits for people living in the districts of intervention. However, the project might induce negative impacts, if protection and mitigation measures are not considered during its implementation. Fortunately, all negative impacts likely to occur can be prevented and/or mitigated as detailed in the ESIA of the project.

Therefore, it is crucial that all set OHS measures proposed in this Plan be properly implemented to assure sustainable safety conditions for both bio-physical and social environments in the project areas. Some of the key recommendations to consider are: (i) provide safety equipment to all workers and enforce their effective use during the construction phase; (ii) increase worker's awareness regarding EHS requirements; (iii) subcontract approved local companies for solid wastes disposal; (iv) Collaborate and involve of local administration (district & sectors) and other connected stakeholders in the project implementation.