



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 EASTERN PROVINCE OF RWANDA



Energy Development Corporation Limited (EDCL)

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EXECUTIVE SUMMARY

Rwanda is experiencing significant socio-economic development, and it is central 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 2029. Under the First National Strategy for Transformation (NST1) for 2017–2024, access to electricity also surged from 34.4% to 78.9 % (MINICOFIN, 2024). Under NST2 (2024-2029), the country intends to scale up of access to electricity and will focus on connecting productive users (such as industries, commercial facilities, schools, health facilities, agro-processing plants, and other facilities) that contribute to socioeconomic development. The ongoing initiatives to provide households with electricity will continue, with the goal of scaling up access from the current level of 78.9% by ensuring that electricity is accessible in all cells and villages of the country.

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. Though proposed activities under ASCENT aims at improving community livelihoods and contribute to economic development, it is anticipated that proposed activities may have negative environmental and social impacts if mitigation measures are not proposed and implemented.

From the above perspectives, 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 for 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 Eastern Province.

Purpose of the ESIA study

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

Project location and description

The ASCENT will be implemented in 27 districts of the country and the City of Kigali with the aim to improve the rate of access to electricity supply countrywide. This ESIA is for the Eastern province covering all 7 districts of the province namely Bugesera, Gatsibo, Kayanza, Kirehe, Ngoma, Nyagatare, and Rwamagana. The project implementation is designed as Engineering, Procurement, and Construction (EPC), thus the design is not yet done to provide detailed information that shall be contained in this ESIA. However, the feasibility study indicates that project activities will consist at three 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 of the project 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 election;
- Transportation of project materials and personnel
- Cable stringing;
- Lines energizing;
- Lines commissioning;
- Lines maintenance including the bush clearing longest the right-of-way during the operation phase

Project alternatives

As the project design is not yet completed and the specific location of project implementation sites are not yet known, the identification of project alternatives includes the consideration of the project implementing entity 'preferred option, as presented 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:

- Designs of electrical infrastructure and technology proposed;
- Route alignment and/or location of project activities;
- Alternative technology use; and
- 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

The preferred option is "Overhead Power Lines." 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 environmental impacts, as well as those resulting from maintaining the RoW where necessary.

Legal, regulatory and institution framework

The proposed project 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, electricity supply, health and safety, 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. The environmental and social assessment considered also international policies and standards applied to ASCENT including WB Environmental and Social Standards (ESS) Asian Infrastructure Investment Bank (AIIB) and other Development Partners (DP). 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.

Stakeholders Engagement

Information collected from the preliminary desk review was completed by information obtained through interviews with key 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 photo log of the consulted people is available on annex 11 of this Report.

Positive Impacts

Regarding the social impacts, the assessment 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 for those who will work with experts

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

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

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

- Value addition to the agricultural products and More reliable services and facilities. This is observed through the availability of grinding mills and other machinery which can process agricultural products that will be set up, or operate at a cheaper cost due to the availability of electricity in the project areas. This will provide value addition to the agricultural products produced by the local farmers there by boosting the economy and the farmer's income.
- More reliable services and facilities will be available at the Health Centres, Schools, Trading Centres and other related services along the project area.
- The standard of living within the project area will generally improve. Positive impacts will be observed in health, the water sector, education, security, communication, and economic activities. Enhanced services will provide significant benefits to the population, gradually improving their quality of life due to the availability of electricity.
- Support to Telecommunications infrastructure operations such community radios, internet cafes as well as phone charging will be observed and reliable. With steady electrical power supply from the national grid, the costs of operations of telecommunication companies will significantly reduce, as well as availability of mobile communication will increase. This as well impacts on businesses and social services positively.
- Improvement and extension of the electricity will lead to improved security through better street lighting in the suburban areas and their environs which will contribute to security of residents and investments.
- Setting up of small-scale industries such as welding workshops, maize mills, carpentry workshops

and other cottage activities will increase leading to further employment after completion of the project. On a short-term, the project will bring about creation of jobs during the construction phase. people in the project areas are likely provide labour force etc for skilled, semi-skilled and unskilled labor etc.

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

- Job opportunities and Income generation

Negative Impacts during the planning and construction phase

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. 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 various 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 include:

- Lack of qualified environmental and social risks management personnel and Instruments: This ESIA is prepared when the detail design is not yet conducted and there might be changes and addition information once the design is completed. Thus, it is important that resources are allocated for assessment site specific impacts, prepare and implement contractor management Plans. This requires recruitment of qualified personnel at contractor and supervising consultant to ensure that proposed mitigation measures are implemented and monitored.
- Loss of crops and trees along the Right of Way and pole's foundations: The alignment of the distribution lines will to the most extent be restricted to the road reserve, pathways and agriculture lands. However, to some extent, during line route survey and electrical lines construction, there will be destruction and removal of natural vegetation, crops and trees. The community in project areas is mostly involved in crop cultivation and animal rearing at subsistence level. Dominant crops in the project areas include maize, cassava, soya beans, sunflower, sweet potatoes, and fruit trees like oranges among others. The removal of tree species and crops will affect local community and food supply chain and income.
- Labor influx and labour issues, risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA): in the project area: A number of workers will be engaged by the contractor to ensure completion of works as per schedule. The workers could come from the project sites or from the neighbouring areas. Some personnel will be involved in erection of pole with others in conductor stringing and installation activities. Working conditions including wages, working hours, use of child labor, sexual harassment among workers and to the community, and workers' grievances may arise. Further, cases of drunkenness, robbery and insecurity, sexual exploitation, and gender based violence and as well as pressure on existing social infrastructure may also be observed.
- 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 that may arise include cuts, bruises, lacerations, and fractures due to unexpected events such as accidents caused by manual handling.
- 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 contamination may be anticipated among workers.
- Health and 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 may also occur and resulting from lack of supervision and job training, improper handling of machinery and hand tools and inappropriate carrying out of tasks.

- Increased traffic in the project area: This project will be implemented in remote and rural areas where traffic is not intensive. In different areas only observed traffics (during the visits of the project sites) are those temporarily available from outside the project area transporting harvest, 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, falling from vehicles, causing injuries and to some extent vehicles may hit people especially children playing in roads.
- Impacts on soil and water: The project works will involve excavations of pole sites and later back filling. Excavation may cause loss of soil and erosion leading to siltation of natural drainage systems and water courses. For this reason, impacts will only be limited to the top soils, without significant intrusion to underlying groundwater, bedrock or any geological features. Soils, surface waters and groundwater will be susceptible to contamination from various sources during the poles installation process. Soil erosion could occur as a result of the removal of vegetation and the disturbance of soils by vehicles or equipment in areas where the distribution lines will transverse, particularly the pole sites. Siting of poles also has to take into consideration local drainage patterns and climate variability, particularly changes in rainfall intensity in the targeted areas.
- Generation of Solid waste: During construction, different types of wastes will be generated. These may include the remains of conductors, conductor drums, left over insulators and other remains of the materials used in construction. Cardboards and other packaging are also expected. Solid and hazardous waste can cause a number of impacts on the surrounding environment. Except for the hazardous fraction of construction waste, the remaining material is likely to be mainly inert and does not pose a threat to human health or the environment. other human waste will also be generated by workers of the project.
- Noise and Vibration pollution: Noise and vibrations will result from construction works, including excavations, concrete mixing and compaction at pole spots, and from vehicles transporting materials, equipment and workers. The receptors of the noise and vibrations include project site workers, project nearby users and residential nearby areas in the vicinity of the proposed power distribution line routes.
- Impact on ambient air quality: During construction, the ambient air quality at local receptors may potentially be affected by increased dust, particularly during construction material haulage, vehicle movements on unpaved roads, dust from uncovered stockpiled powdery materials or truckloads, emission and particulates from vehicles,
- Human waste disposal issues: Sanitary waste will be an issue of concern since most of the workers will be carrying out various activities at the site throughout the day. The sensitive receptors are the water sources from which the local community access water e.g. boreholes, unprotected springs, swamps, Lakes, Rivers and streams. Poor human waste disposal will affect the water sources and soil in the project area.

Negative impacts during operational phase and maintenance

- Theft of equipment and Vandalism of power distribution infrastructure: during the operation phase vandalism might lead to electrocution but the magnitude of the impact will be minor if the local community are sensitized on the negative effects of stealing and vandalizing electrical installations. Vandalism will also deny the local community the benefits of constant power supply due to the resulting disruptions.
- Soil and water pollution from transformer oil spillages: There is potential for accidental spillages from transformer oil at any stage of the project cycle that can be a source of concern i.e. during the preparation, construction stage at the equipment storage yard and during the operation phase when maintaining the transformers. This leakage can pollute soils and water sources. Accidental spills can also be experienced when transporting oil to the sites for purposes of filling transformers that may have leaked their oil during transportation, storage, or installation.
- 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.

- Air pollution: Decommissioning impacts on air quality will be similar to construction impacts due to the presence of construction vehicles and trucks. This is considered to be a moderate negative impact as a result of localized dust.

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. 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 permanent 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 such as construction of the houses under electrical lines, planting trees higher than 3 meters, etc as per RURA Guidelines. For any impact on crops and trees RAP will be prepared and implemented.. ., 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 restoration, PAPs will be guaranteed jobs during the project implementation. All these provisions will be indicated in the RAP to be prepared.

Environmental and Social Management Plan (ESMP)

Mitigation measures have been identified through considering each impact identified, especially what can be done about the high and medium negative impacts and 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 ESMP and 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 impact mitigation measures. An Environmental and Social Risk Management 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

Taking into consideration the nature, location, extent and the planned project activities, the consultant has identified impacts relating 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. The project will be implemented with careful implementation of proposed impact mitigation measures. Given that detailed design is not yet available to assess site specific impacts, it is recommended that the contractor's contracts include the provisions to prepare and implement a detailed contractor's Environmental and Social Management Plan (C-ESMPs) once the detailed design is finalized. Further, it is recommended that once the final right of way is identified, the project to prepare a Resettlement Plan for assets to be affected in the right of way and where poles will be installed. The estimated amount for the

implementation of proposed mitigation measures is estimated at **267,000 US\$**. This figure does not include compensation budget as the detailed budget will be determined as part of the RAP preparation.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	II
LIST OF FIGURES	XII
LIST OF TABLES	XII
LIST OF ANNEXES	XIII
ACRONYMS	XV
1. INTRODUCTION.....	1
1.1. ASCENT Project description	1
1.2. ESIA consultant.....	3
1.3. Project Implementing entity	3
1.4. Objectives of the ESIA study	3
1.5. Scope of the study	4
1.6. Approach and methodology.....	4
1.6.1. Documents review	4
1.6.2. Socio-Economic baseline data collection	5
1.6.3. Physical and ecological baseline survey	5
1.6.4. Stakeholders' consultations	5
2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK.....	6
2.1 National legal and regulatory framework.....	6
2.1.1 National Policies relevant to this sub-project implementation in Eastern province	6
2.1.2 National Regulations	9
2.2. National Institutional Framework.....	11
2.2.1. Institution framework for energy and environment management.....	11
2.2.2. Institution framework for child protection, Gender Based Violence(GBV) and Labor management	15
2.2.3. Institutional framework related to social protection.....	17
2.3. World Bank's Environmental and Social requirements applicable to the project.....	17
2.4. World Bank's Environmental, Health, and Safety (EHS) Guidelines for Electric Power Transmission and Distribution	20
2.5. Other World Bank's Environmental, Health, and Safety Guidelines applied to the project.....	21
2.6. International Conventions	22
2.7. International agreements	23
3. PROJECT JUSTIFICATION AND DESCRIPTION.....	35
3.1 Project location	35
3.2 Project justification	35
3.3 Benefits of access to electric power	35
3.4 Project components	36
3.5 Project activities.....	37
3.5.1 Activities during the design and planning phase.....	38
3.5.2 Project activities during the construction phase	38
3.5.3 Activities of the project during the operation phase	39
3.5.4 Activities of the project during decommissioning phase	39
4. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE STATUS.....	40
4.1 General overview	40
4.2. Nyagatare District	40
4.2.1. Physical environment.....	40

4.2.1	Ecological environment	41
4.2.2	Socio-economic environment	42
4.3.	Gatsibo District	48
4.3.1.	Physical environment	48
4.3.2.	Ecological environment	49
4.3.3.	Socio-economic characteristics	50
4.4.	Kayanza District.....	57
4.4.1.	Physical environment	57
4.4.2.	Ecological environment	58
4.4.3.	Socio-economic characteristics	59
4.5.	Ngoma District.....	66
4.5.1.	Physical environment	66
4.5.2.	Ecological characteristics	67
4.5.3.	Socio-economic characteristics	68
4.6.	Kirehe District.....	76
4.6.1.	Physical environment	76
4.6.2.	Ecological characteristics	77
4.6.3.	Socio-economic characteristics	78
4.7.	Bugesera District	84
4.7.1.	Physical environment	84
4.7.2.	Ecological characteristics	85
4.7.3.	Socio-economic characteristics	86
4.8.	Rwamagana District.....	94
4.8.1.	Physical environment	94
4.8.2.	Ecological characteristics	95
4.8.3.	Socio-economic characteristics	96
5.	PUBLIC CONSULTATION AND PARTICIPATION.....	103
5.1	Overview	103
5.2	Purpose.....	103
5.3	Public participation – methods and process	103
5.4	Consultation held during the preparation of this ESIA.....	105
5.3.1.	Consultation with technical, regulator and official at central and local level	105
5.3.2.	Consultation at community level.....	105
6.	PROJECT ALTERNATIVES ANALYSIS.....	108
6.1.	Identification of alternatives	108
6.2.	Analysis of alternatives.....	108
7.	POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS.....	110
7.1.	Project positive impacts	110
7.2.	Project negative impacts during planning and construction phase.....	112
7.2.1	Negative socio-economic impacts and their mitigation measures	113
7.2.2	Negative physical impacts and their mitigation measures	118
7.2.3	Negative Biological impacts and their mitigation measures	122
7.3.	Adverse impacts during operation and maintenance phase.....	124
7.3.1	Negative Socio-economic impacts during the operation phase	124
7.4.	Negative impacts during the decommissioning phase.....	127
8.	ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS	129
8.1.	Environmental and Social Management Plan	129

8.2. Environmental and Social Monitoring Plan	144
8.3. Implementation arrangement and responsibilities	151
8.3.1. Overall implementation responsibility	151
8.3.2. Roles and responsibilities of EDCL	151
8.3.3. Roles of the Project Coordination Unit	151
8.3.4. Roles of contractors	151
8.3.5. Roles of supervising consultants.....	152
8.3.6. Roles of MININFRA.....	152
8.3.7. Roles of MINALOC.....	152
8.3.8. Roles of REMA	152
8.3.9. Roles of districts and other local authorities	152
8.3.10. Roles of local communities	152
8.3.11. Roles of other key stakeholders.....	152
8.4. Grievance Redress Mechanism (GRM)	153
8.4.1. Objectives of GRM	153
8.4.3. Workers Grievance Redress Mechanism.....	158
8.4.4. Gender-Based Violence related complaints	160
8.4.5. Grievance Logbook	161
8.5. Environmental and social safeguards training and capacity building	161
8.5.1. Environmental and Social training.....	161
8.4.2. Community awareness, outreach, and training	163
CONCLUSIONS AND RECOMMENDATIONS.....	164
9.1 Conclusions	164
9.2 Recommendations	164
REFERENCES	166

LIST OF FIGURES

Figure 1: Proposed map indicating the project location and scope	2
Figure 27: Consultations with local community	106
Figure 28: Proposed community GRM flow chart.....	156
Figure 30: Grievances redress process	Error! Bookmark not defined.

LIST OF TABLE

Table 1: Summary ASCENT Project components.....	2
Table 2: National Institutional Framework	12
Table 3: National institutions related to child protection, Gender-Based Violence and labour management	15
Table 4: World Bank's Environmental and Social Standards applicable to the project.....	17
Table 5: World Bank's EHS)Guidelines for Electric Power Transmission and Distribution	20
Table 6: World Bank's Environmental Health and Safety Guidelines applied to the project	21
Table 7: Environmental assessment-related agreements	23
Table 8: Differences between Rwanda regulations and World Bank Environmental and Social Framework/Standards/ESF/ESSs	24
Table 9: Project key main components	36
Table 8: <i>Length of the MV and LV lines to be constructed and number of transformers to be installed</i>	37
Table 11: Standard pole sizes.....	38
Table 12: Population of Nyagatare District by Sector and sex	42
Table 13: Number of households and their corresponding population, mean size and sex of household head	43
Table 14: Distribution of households in Nyagatare District by type of habitat.....	43
Table 15: Distribution (Count and %) of the resident population of Nyagatare District aged 3 and above by highest level of school attended by sector (Both sexes).	44
Table 16: Distribution of household engaged in livestock husbandry in Nyagatare District	45
Table 17: Percentage of private households and of Nyagatare District possessing electrical appliance	46
Table 18: Distribution of households of Nyagatare District by main source of energy for lighting	47
Table 19: Number and share (%) of persons with vulnerability by Sector of residence and sex	48
Table 18: Share of persons with Disabilities by types of Disability in Nyagatare District.....	Error! Bookmark not defined.
Table 21: Population of Gatsibo District by Sector and sex	50
Table 22: Number of households and their corresponding population, mean size and sex of household head	51
Table 23: Distribution of households in Gatsibo District by type of habitat	52
Table 24: Population of Gatsibo District aged 3 and above by highest level of school attended by sector ..	53
Table 25: Distribution of household engaged in livestock husbandry in Gatsibo District	54
Table 26: Percentage of private households and of Gatsibo District possessing electrical appliance	55
Table 27: Distribution of households of Gatsibo District by main source of energy for lighting	56
Table 28: Persons with vulnerability of Gatsibo District by Sector of residence and sex.....	56
Table 29: Population of Gatsibo District by Sector and sex	59
Table 30: Number of households and their corresponding population, mean size and sex of household head	60
Table 31: Distribution of households in Gatsibo District by type of habitat	61
Table 32: Percentage of private households and of Gatsibo District possessing electrical appliance	62
Table 33: Population of Kayonza District aged 3+ by highest level of school attended by sector	62
Table 34: Distribution of household engaged in livestock husbandry in Kayonza District.....	63
Table 35: Distribution of households of Gatsibo District by main source of energy for lighting	65
Table 36: Persons with vulnerability of Kayonza District above by Sector of residence and sex	66

Table 37: Population of Ngoma District by Sector and sex	69
Table 38: Number of households and their corresponding population, mean size and sex of household head	70
Table 39: Distribution of households in Ngoma District by type of habitat.....	70
Table 40: Resident population of Ngoma District aged 3 plus by highest level of school attended	71
Table 41: Distribution of household engaged in livestock husbandly in Ngoma District	73
Table 42: Percentage of private households and of Ngoma District possessing electrical appliance	74
Table 41: Distribution of households of Ngoma District by main source of energy for lighting	75
Table 44: Persons with vulnerability of Ngoma District by Sector of residence and sex	76
Table 45: Population of Kirehe District by Sector and sex	78
Table 46: Number of households and their corresponding population, mean size and sex of household head	79
Table 47: Distribution of households in Kirehe District by type of habitat	79
Table 48: Percentage of private households possessing electrical appliance	81
Table 49: Resident population of Kirehe District aged 3 plus by highest level of school attended	81
Table 50: Distribution of household engaged in livestock husbandly in Kirehe District	82
Table 51: Distribution of households by main source of energy for lighting	83
Table 52: Persons with vulnerable of Kirehe District by Sector of residence and sex	84
Table 53: Population of Bugesera District by Sector and sex in 2022	86
Table 54: Number of households and their corresponding population, mean size and sex of household head	87
Table 55: Resident population of Bugesera District aged 3 Plus highest level of school attended by sector	88
Table 56: Distribution of household engaged in livestock husbandly in Bugesera District	89
Table 57: Distribution of households by type of habitat.....	91
Table 58: Percentage of private households possessing electrical appliance	92
Table 59: Distribution of households of Bugesera District by main source of energy for lighting	92
Table 60: Persons with vulnerability of Bugesera District by Sector of residence and sex.....	93
Table 61: Population of Rwamagana District by Sector and sex in 2022	96
Table 62: Number of households and their corresponding population, mean size and sex of household head	97
Table 63: Distribution of households in Rwamagana District by type of habitat	98
Table 64: Resident population of Rwamagana District aged 3 Plus highest level of school attended	99
Table 65: Distribution of household engaged in livestock husbandly in Rwamagana District	99
Table 66: Percentage of private households and of Rwamagana District possessing electrical appliance	100
Table 67: Distribution of households of Rwamagana District by main source of energy for lighting.....	101
Table 68: Persons with vulnerability of Rwamagana District by Sector of residence and sex	102
Table 69: Categories of consulted stakeholders at institutional level	104
Table 70: Summary of discussions with stakeholders.....	106
Table 71: Description of identified alternatives.	108
Table 72: Analysis of alternatives	108
Table 73: Environmental and Social Management Plan.....	130
Table 74: Types of wastes to be monitored and their alternative destinations	146
Table 75: Environmental and Social Monitoring Plan to be implemented in each district of the province ..	148
Table 76: Proposed Members of GRC and their roles under project.....	154
Table 77: Grievance Redress Process at Project Level	Error! Bookmark not defined.
Table 78: ESHS training plan	162
Table 79: Community outreach and training	163
Table 78: OHS training plan;	330

p

LIST OF ANNEXES

Annex 1: Terms of reference for ESIA of EPC East	167
Annex 2: Environmental and Social Management and Monitoring Plan for Bugesera District	172
Annex 3: Environmental and Social Management and Monitoring Plan for Gatsibo District	188
Annex 4: Environmental and Social Management and Monitoring Plan for Kayonza District	203
Annex 5: Environmental and Social Management and Monitoring Plan for Kirehe District	219
Annex 6: Environmental and Social Management and Monitoring Plan for Ngoma District	234
Annex 7: Environmental and Social Management and Monitoring Plan for Nyagatare District	250
Annex 8: Environmental and Social Management and Monitoring Plan for Rwamagana District.....	263
Annex 9: Maps of the project location	283
Annex 10: Guidelines of the Right of Way for electrical power lines	286
Annex 11: List of contacted persons	287
Annex 12: Physical Cultural Resource (PCR) and Chance Finds Procedure	293
Annex 13: Typical fauna and flora mostly frequent in the project areas and their conservation status	294
Annex 14: Occupational Health and Safety Plan	300

ACRONYMS

ASCENT	: Accelerating Sustainable and Clean Energy Access Transformation
AIIB	: Asian Infrastructure Investment Bank
BESST	: Bureau for Engineering and Environmental Studies
7YGP	: 7-Year Government Program
CO₂	: Carbon Dioxide
EDCL	: Energy Development Corporation Limited
EIA	: Environmental Impact Assessment
ESIA	: Environmental and Social Impact Assessment
ESMF	: Environmental and Social Management Framework
ESMP	: Environmental and Social Management Plan
ESF	: Environmental and Social Framework
ESS	: Environmental and Social Standards
ESSP	: Energy Sector Strategic Plan
GBV	: Gender Based Violence
GOR	: Government of Rwanda
ICT	: Information & Communication Technology
LMP	: Labour Management Procedures
LV	: Low Voltage
MININFRA	: Ministry of Infrastructure
MoE	: Ministry of Environment
MDPs	: Multiple Development Partners
MV	: Medium Voltage
MW	: Mega Watts
NGOs	: Non-Governmental Organizations
NST1	: National Transformation Strategy – Phase 1
OHS	: Occupational Health and Safety Plan
OS	: Operational Standards
RDB	: Rwanda Development Board
REG	: Rwanda Energy Group
REMA	: Rwanda Environment Management Authority
RoW	: Right-of-Way
RPF	: Resettlement Policy Framework
RUEP	: Rwanda Universal Energy Access Program
RURA	: Rwanda Utility Regulatory Agency
SEP	: Stakeholder Engagement Plan
SDGs	: Sustainable Development Goals
WB	: World Bank

1. INTRODUCTION

Rwanda is undergoing remarkable 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 2029 countrywide. Under the First National Strategy for Transformation (NST1) for 2017–2024, Access to electricity also surged from 34.4% to 78.9 % (MINICOFIN, 2024). Under NST2(2024-2029), the country intends to scale up of access to electricity and will focus on connecting productive users (such as industries, commercial facilities, schools, health facilities, agro-processing plants, and other facilities) that contribute to socioeconomic development. The ongoing initiatives to provide households with electricity will continue, with the goal of scaling access up from the current level of 78.9% by ensuring that electricity is accessible in all cells of the country.

The NST2 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 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. Under NST2, the country will focus on scaling up access to electricity (on-grid/ off-grid) to productive users (industries, health facilities, schools, agro-processing plans among others) and rolling out access to electricity in all cells of the country to facilitate household connections, Increase energy generation capacity to meet demand projection and maintain the spinning reserve and Increase the share of renewable energy in power generation mix.

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 investments 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, Kayanza, 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 districts of the Eastern Province. Then map below indicates the administrative District allocation of each development partner whereby the co-financing has the same colour as shown below:

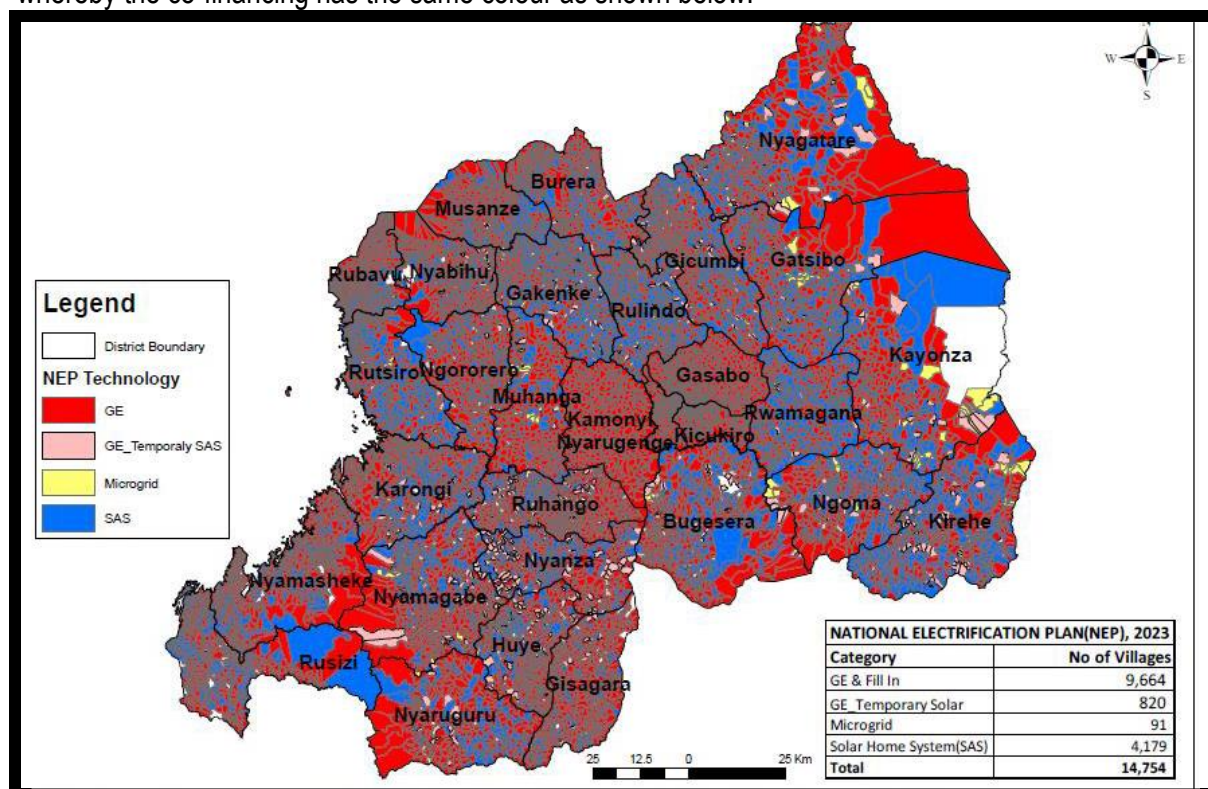


Figure 1: Proposed map indicating the project location and scope

Source: REG-EDCL, 2024

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. ESIA consultant

The present ESIA report was prepared by the Bureau for Engineering and Environmental Studies (BESST Ltd). BESST Ltd is a private company registered with the Rwanda Development Board (RDB) and is a certified EA firm of expertise under the Rwanda Association of Environmental Professional Practitioners (RAPEP/EA/071). It has its headquarters in Kigali Rwanda, Gasabo district, KG 182 St, Martin Plaza, second Floor. The company is specialized in Environmental Studies, Social Studies, Feasibility and Engineering design studies, social assessment, Involuntary Resettlement, Climate Change risk assessment, socio-economic assessment, baseline surveys, waste management, water and sanitation, and advisory services in sectors ranging from Agriculture, energy development, Infrastructure and housing development, transport, and water supply.

1.3. Project Implementing entity

The present project will be implemented by the Rwanda Energy Group (REG). REG has established a Project Implementation Unit (PIU) in its subsidiary, EDCL, to provide the leadership that will run the project in coordination with the departments within EDCL. The PIU is responsible for ESMF development and approval and control over its implementation and advice to EDCL and the Contractor on compliance with WB Environmental and Social Standards, and national laws in the field of environmental and social protection during all project activities. The PIU will carefully analyze the project scope, their availability to the project activities and their capacity for the successful implementation of the project. If need be, they can suggest additional supporting staff for the project and ESMF/ESIA implementation.

The project will utilize the implementation arrangements of the on-going EAQIP (P172594) and Renewable Energy Fund (REF; P160699) and will be jointly implemented by EDCL. As under EAQIP, EDCL will cover all grid-related components (components 1 and 2), the institutional clean cooking program (subcomponent 3e), and the overall program coordination. Using the same implementation arrangements that are efficiently working under EAQIP will eliminate duplication of effort and transaction costs for the GoR, enhance the efficiency of implementation, strengthen the capacity of the Government institutions, and help streamline development partner coordination of the program. The project will utilize the existing PCU that was created for the implementation of the RUEAP program, under which the EAQIP project is being implemented

1.4. Objectives of the ESIA study

The overall objective of this assignment is to develop an Environmental and Social Impacts Assessment (ESIA) including an Environmental and Social Management Plan and Environmental and Social Monitoring Plan (ESM&MP) 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/standards and regulations. These include the World Bank and AfDB Environmental and Social Standards triggered by the project. The ESIA shall also comply with all provisions included in the framework documents including the Environmental and Social Management Framework(ESMF), Resettlement Policy Framework(RPF), Labour Management Procedures(LMP) and Stakeholder Engagement Plan(SEP).

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.

1.5. 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 ESIA study covered the impacts of the 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 in the Eastern 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. This 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. Based on the project extent, a standalone ESMP was developed for each district making the eastern province.
- Propose an Environmental and Social Monitoring Plan with measurable indicators and parameters for these mitigation measures to ensure the sustainability of the project.

1.6. Approach and methodology

The methodology used to conduct this environmental and social impact assessment was drained 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, consultations with stakeholders and local residents, field visits, 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.

Given that the project is an EPC and detailed design is not yet conducted, the environmental and social Impact assessment was based on available information in the preliminary feasibility study, specifications included in tender documents and information collected during field visits in sample location in districts of Eastern Province namely Bugesera, Gatsibo, Kayanza, Kirehe, Ngoma, Nyagatare, and Rwamagana 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.

1.6.1. 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 for (RPF)ASCENT;
- Environmental and Social Commitment Plan (ESCP);
- Fifth Population and Housing Census – 2023;
- Stakeholder engagement Plan(SEP) for ASCENT, World Bank Environmental and Social standards;
- District development strategies (DDSs);
- World Bank ESF.

1.6.2. 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 residents. 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 2023. The presented data covers the Eastern 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.

1.6.3. Physical and ecological baseline survey

The physical and ecological data were collected during the field surveys and included those reported by residents of the project areas. 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 which were analyzed in return after the survey. Other data related to fauna and flora were collected from literature review from different sources. 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 most of the line routes will be passing along the existing buffer zones of the local roads of the project areas whereby vegetation is almost cleared and only bushes and shrubs are concerned Common crops of the project area shall be also affected as detailed in the chapter of baseline of the project area. The list of typical surveyed flora and fauna and collected from interviews with local residents is provided in annex 13 of this report.

1.6.4. Stakeholders' consultations

The methodology used for consultations consisted of interviews and meetings that were conducted at different locations of the project areas. At each site, consultant used a guiding questionnaire with different topics for discussion to provide information about the project. Key topic discussed included project positive and negative impacts, project components and land requirements, project activities and extent, project lines routes etc. 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 photo log 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 (NST2, 2024-2029) 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

2.1.1 National Policies relevant to this sub-project implementation in Eastern province

✓ **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 (NST2)**

Under the First National Strategy for Transformation (NST1) for 2017–2024, Access to electricity also surged from 34.4% to 78.9 % (MINICOFIN, 2024). Under NST2(2024-2029), the country intends to scale up of access to electricity and will focus on connecting productive users (such as industries, commercial facilities, schools, health facilities, agro-processing plants, and other facilities) that contribute to socioeconomic development. The ongoing initiatives to provide households with electricity will continue, with the goal of scaling access up from the current level of 78.9% by ensuring that electricity is accessible in all cells of the country.

✓ **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 endeavour 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. Restoration of affected trees will be done through repletion of the same affected tree species.

✓ **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.

2.1.2 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 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° 064/2021 of 14/10/2021 Governing biological diversity in Rwanda

The purpose of this Law is to conserve, manage, protect and promote biological diversity. Under this Law, Art 13 stipulates that Every person has the duty to defend, protect, conserve and promote the biological diversity. The article 15 stipulates that a Ministerial Order establishes the list of invasive species and this list is reviewed every five (5) years and whenever necessary. Art 16 highlights that activities involving species or specimens included on the list of endangered or protected species as annexed to the law are prohibited unless authorized by the Minister.

It is important to note that there was no sensitive and/ or protected biological diversity as established on the list that has been identified of expected to be affected by the project.

✓ **Law regulating labor in Rwanda N° 66/2018 of 30/08/2018 and its amendment of 18/05/2023**

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 that project 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. Institution framework for energy and environment management

The next table provide key institutions involved in environmental and social risks management as well as energy sector in Rwanda including key roles and responsibilities.

Table 2: National Institutional Framework

Institution	Objective/ Vision	Roles/ Responsibilities
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	The ministry is not directly involved in activities involved under ASCENT but projects activities are designed and implemented in compliance with policies and strategies established by the ministry.
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).	REG works closely with both EUCL and EDCL in the implementation of ASCENT activities.
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.	EUCL is responsible for electricity distribution network and work closely with EDCL in the implementation of ASCENT activities
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 neighboring countries and power pools. EDCL works closely with MININFRA	EDCL is the direct implementation Entity for ASCENT activities and associated Safeguards instruments.
Ministry of Environment (MoE)	MoE was established to ensure the protection and conservation of the environment and ensure optimal and rational utilization of Water Resources, Lands and Forests for sustainable national development. MoE is responsible for the development of environmental policies and procedures (including impact assessments), protection of natural resources (water, land, flora, and fauna), environmental legislation, biodiversity, and other environmental aspects.	The MoE will monitor and ensure that the project is implemented in a sustainable manner and in line with the existing environmental protection and conservation policies, laws and other legal requirements. In the case that EIA certificate is not issued, project developer may make an appeal to the Ministry of Environment.

Institution	Objective/ Vision	Roles/ Responsibilities
Rwanda Environmental Management Authority (REMA)	REMA was established to implement the environment matters pertinent to the environment and climate change. REMA acts as implementation organ of environment related policies and laws in Rwanda. Key responsibilities of REMA are: - Advise the Government on policies, strategies and legislation related to the management of the environment as well as the implementation of environment related international conventions, whenever deemed necessary; - Conduct thorough inspection of environmental management to prepare a report on the status of environment in Rwanda that shall be published every two (2) years; - Put in place measures designed to prevent climate change and cope with its impacts; - Conduct studies, research, investigations, and other relevant activities in the field of environment and publish the findings; - Closely monitor and assess development programs to ensure compliance with the laws on environment during their preparation and implementation; - Participate in the preparation of activities strategies designed to prevent risks and other phenomena which may cause environmental degradation and propose remedial measures; - Provide, where it is necessary, advice and technical support to individuals or entities engaged in natural resources management and environmental conservation; - Prepare, publish and disseminate education materials relating to guidelines and laws relating to environmental management and protection and reduce environmental degradation risks; - Monitor and supervise impact assessment, environmental audit, strategic environmental assessment, and any other environmental study. REMA may authorize in writing, any other person to analyze and approve these studies. The EIA review has been delegated to Rwanda Development Board.	REMA will be responsible for the environmental audits and project implementation environmental compliance.
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 audio-visual 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.	RURA carries 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.

Institution	Objective/ Vision	Roles/ Responsibilities
Rwanda National Land Authority (NLA)	NLA is responsible for putting in place and operationalizing an efficient system of land administration, use and management that secures land ownership, promotes investment in land for socio-economic development and poverty reduction. Responsibilities of NLA are: - Put in place mechanisms which procure security of land tenure for the promotion of investments in land. - Promote proper allocation of land, and proper use of land resources, according to their potential. - Avoid the splitting up of plots and promote their regrouping to bring about optimum production. - Establish mechanisms which facilitate an optimum exploitation of land, targeting the social-economic development of the country. - Orient land management towards a more profitable and sustainable production, by making good choices among methods of land development. - Develop methods that protect land resources from various types of land degradation. - Establish institutional frameworks, which enable land to become more valuable in the economy or at the market. - Promote research as well as the education of the public on all aspects concerning land tenure, management, and transactions. - Establish order and discipline in the allocation of land, as well as in land transactions to control the pressure on land, inappropriate development, speculation and trafficking of land. - Involve and sensitize the public at all levels to ensure protection of the environment and good management of the land. - Ensure the sustainable use of wetlands	The role of NLA in this project is to guarantee the wise use of the land allocated for the project and will play key roles in land re-adjustment and registration as well as the land transfer process (where necessary). .
Rwanda Development Board (RDB)	RDB was created by Organic Law N° 53/2008 of 02/09/2008 and has mission of improving the well-being of all Rwandans by fast-tracking development, catalysing sustainable economic growth, and creating prosperity for all. This a one stop institution bringing together several government bodies in Rwanda focused at promoting investment in Rwanda. Initially the responsibility for reviewing and approving ESIA reports was entrusted to REMA, this duty has now been transferred to RDB. Key responsibility of ESIA department under One Stop centre in RDB is to: - Receive and register ESIA Applications (Project Briefs) submitted by developers; - Identify relevant Lead Agencies to review Project Briefs and provide necessary input during screening, - Review Project Briefs and determine project classification at screening stage, - Transmit Project Briefs to relevant Lead Agencies and concerned Local Governments to provide input on Terms of Reference (ToRs),	RDB in this project is a key partner as it will be responsible for reviewing the ESIA report and issuing the EIA certificate before project implementation.

Institution	Objective/ Vision	Roles/ Responsibilities
	- Publicize Project Briefs and collect public comments during development of ToRs, - Receive ESIA documents submitted by a developer and verify that they are complete, - Transmit copy of ESIA Reports to relevant Lead Agencies, Local Governments and Communities to review and make comments, - Review ESIA reports and make decision on approval, organize, and conduct public hearings, appoint an officer from Authority to chair public hearings, receive public comments and compile public hearing reports, - Appoint the Technical Committee and its representative to the Technical Committee, - Forward ESIA Documents (ESIA Report, Environment Monitoring Plan and Public Hearing Report) to the Technical Committee, - Chair the Executive Committee which makes final decision on approval of a project, - Communicate decision on whether a proposed project is approved, - Issue developers ESIA Certificate of Authorization if their projects are approved.	
Districts and their decentralized entities	As per the Article 61 of the law on environmental, Districts and decentralized entities are responsible for the implementation of laws, policies, strategies, objectives, and programs relating to protection, conservation, and promotion of the environment in Rwanda. decentralized entities are particularly responsible for: - ensuring activities related to better management of land, especially controlling soil erosion and tap rainwater; - afforestation, protection, and proper management of forests; - efficient management of rivers, lakes, sources of water and underground water; - efficient management and effective use of swamps; - Protection and proper management of reserved areas, historical sites, endangered animal and plant species.	Districts and local decentralized entities especially the sectors and cells of the project area will play key and different roles through all phases of the project implementation. Both districts are also implementing entity of Resettlement Measures.

2.2.2. Institution framework for child protection, Gender Based Violence (GBV) and Labor management

In addition to institutions dealing with energy, environment and social risks, there also institutions dealing with other areas such as social protection, child protection, and gender-based protection and labour management which will play a role in the project implementation but also in the implementation of project environmental and social impacts. These institutions are presented in the next table.

Table 3: National institutions related to child protection, Gender-Based Violence and labour management

Institution	Mission	Role/ Responsibilities
Ministry of Gender and Family	To promote gender equality, family stability, and children's rights.	The ministry will Ensure gender equality is mainstreamed in all project activities and will Monitor and evaluate that gender-based violence

Institution	Mission	Role/ Responsibilities
Promotion (MIGEPROF)		and family welfare programs. And implemented through the project.
National Commission for Children (NCC)	To promote and safeguard children's rights in Rwanda.	The commission will play roles in ensuring the protection of all children in all form of the project implementation No child employment will be allowed on the project.
Rwanda National Police (Child Protection Unit)	To prevent and combat child abuse and exploitation, ensure the safety and security of children.	The unit will play role in handling cases related to child abuse, neglect, and exploitation, investigate cases of child abuse, protect children from abuse and exploitation and collaborate with other institutions for child protection.
Ministry of Public Service and Labour (MIFOTRA)	To ensure productive employment, effective labour administration, and social protection in the labour sector.	The ministry will play roles related to Protect workers' rights and promote decent employment opportunities, ensure social security for workers. Enforce labour laws and standards and ensure the implementation of social protection policies during the project implementation.
Rwanda Social Security Board (RSSB)	To manage social security benefits for Rwandans, including pensions, health insurance, and occupational hazards.	The board will play roles in Ensure social protection for all project workers, Provide financial support in case of occupational risks. Manage project worker's health insurance, and occupational risk schemes and will Monitor compliance with social security laws during the project implementation.
Rwanda Investigation Bureau (RIB)	To investigate and prevent crimes related to child abuse, labour exploitation, and gender-based violence.	RIB will play roles to Investigate cases of child abuse and gender-based violence. Collaborate with other institutions for crime prevention and fight crimes related to child exploitation, and abuse etc. RIB works with Isange one stop center and GBV task forces to address gender based violence and Sexual exploitation cases.
Gender Monitoring Office (GMO)	To promote gender equality and fight gender-based violence through monitoring and advocacy.	The office will play roles in Ensuring gender equality in all phases of the project implementation, and combat gender-based violence and discrimination
National Women's Council (NWC)	To promote women's participation in the country's socio-economic development and decision-making processes.	The council will among other advocate for women's right, Support capacity building and leadership development for women and empower women and enhance their socio-economic status
National Commission for Human Rights (NCHR)	To promote and protect human rights in Rwanda, with a focus on gender equality and social justice.	The commission will play roles in monitoring and reporting on human rights violations, investigate cases of labor exploitation, child abuse, and gender-based violence and will among other protect vulnerable groups, including children and women during all phases of the project.

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

The present project implementation is funded by the World Bank and Asian Infrastructure Investment Bank (AIIB). As the World Bank is the lead co-financier, both financiers agreed that the project needs to comply with the WB's Environmental and Social Framework and related ES Standards. The next table summarizes standards relevant to the World Bank and borrower's requirements.

Table 4: 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	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

SN	World Bank ESS	Objectives	Borrower Requirements
		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.	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	the borrower should prepare a plan for compliance with ESS3: Resource Efficiency and Pollution Prevention and Management should that includes a structured approach to minimizing resource use, reducing pollution, and ensuring sustainable environmental practices. The plan shall include but not limited to (i) Resource Efficiency Plan; (ii) Pollution Prevention and Management Plan; (iii) Greenhouse Gas (GHG) Emissions Management; (iv) Sustainable Management of Chemicals and Hazardous Materials; (v) Emergency Preparedness and Response Plan; and (vi); Stakeholder Engagement and Community Involvement.
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; Ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	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 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 labor 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	Ensure that the acquisition on 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,

SN	World Bank ESS	Objectives	Borrower Requirements
		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.	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 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. Put in place 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 Information Disclosure	Establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build 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	Preparation and implementation of a Stakeholder Engagement Plan (SEP). The SEP involves early identification of 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

SN	World Bank ESS	Objectives	Borrower Requirements
		social risks and impacts is disclosed to stakeholders in a 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.	disclosure and to achieve meaningful consultation and GRM establishment and operationalization as well.

2.4. World Bank's Environmental, Health, and Safety (EHS) Guidelines for Electric Power Transmission and Distribution

The World Bank's Environmental, Health, and Safety (EHS) Guidelines for Electric Power Transmission and Distribution provide comprehensive recommendations to mitigate environmental and health risks associated with the construction and operation of electrical lines. Below is a summarized table highlighting key guidelines and their relevance to electrical line construction that would be applied during the implementation of the present project.

Table 5: World Bank's EHS)Guidelines for Electric Power Transmission and Distribution

Guideline	Summary	Relevance to the project
Terrestrial Habitat Alteration	Avoid critical habitats by utilizing existing corridors and roads; install lines above existing vegetation to minimize clearing; schedule construction to avoid breeding seasons; revegetate disturbed areas with native species.	Minimizes ecological disruption and maintains biodiversity during construction activities.
Right-of-Way Maintenance	Implement integrated vegetation management; selectively remove tall-growing species; encourage low-growing vegetation; remove invasive species; schedule maintenance to avoid sensitive periods for wildlife.	Ensures safe operation of transmission lines while preserving local ecosystems and preventing habitat fragmentation.
Aquatic Habitat Protection	Avoid clearing in riparian zones; minimize machinery use near watercourses; implement erosion and sediment control measures; maintain buffer zones of natural vegetation along water bodies.	Protects water quality and aquatic ecosystems from sedimentation and pollution during construction.
Electric and Magnetic Fields (EMF)	Design transmission lines to meet international EMF exposure guidelines; maintain appropriate distances from residential areas; conduct public consultations to address EMF concerns.	Reduces potential health risks to nearby communities and addresses public concerns regarding EMF exposure.
Hazardous Materials Management	Develop procedures for handling and storing hazardous materials; train workers in spill prevention and response; dispose of waste materials according to regulatory requirements.	Prevents environmental contamination and ensures worker safety during the handling of hazardous substances.
Occupational Health and Safety	Provide workers with personal protective equipment (PPE); implement fall protection measures; establish emergency response plans; conduct regular safety training sessions.	Enhances worker safety and reduces the risk of accidents and injuries during construction activities.

Community Health and Safety	Inform communities about construction schedules and potential hazards; implement traffic safety measures; establish grievance mechanisms for community concerns.	Minimizes disruptions and health risks to local communities, fostering good relations and cooperation.

Adhering to these guidelines ensures that the construction of electrical lines is conducted in an environmentally responsible manner, safeguarding both ecosystems and human health.

2.5. Other World Bank's Environmental, Health, and Safety Guidelines applied to the project

The implementation of the present project should adhere to several of the World Bank's Environmental, Health, and Safety (EHS) Guidelines specifically the General EHSs and the EHSs for Power Transmission and Distribution in order to ensure sustainable and safe implementation. Below is a table summarizing the relevant guidelines, their summaries, and their relevance to the project.

Table 6: World Bank's Environmental Health and Safety Guidelines applied to the project

EHS Guideline	Summary	Relevance
Occupational Health and Safety	Addresses worker safety, PPE usage, fall protection, electrical hazards, and training requirements.	Ensures safe working conditions during pole erection, line stringing, and equipment installation.
Community Health and Safety	Involves preventing risks to communities such as electrocution, traffic accidents, and unauthorized access to sites.	Helps reduce risks to people living near construction sites or power lines in rural areas.
Waste Management	Encourages proper management of construction waste such as packaging, used materials, and oily waste.	Ensures proper disposal of poles, conductors, insulators, and associated waste to protect the environment.
Noise and Vibration	Recommends limiting construction noise through timing, equipment maintenance, and community notification.	Helps prevent noise disturbance in quiet rural environments during construction activities.
Air Emissions and Dust Control	Suggests minimizing dust and vehicle emissions via watering, covering loads, and equipment maintenance.	Relevant for rural roads and dry areas where dust levels can become a nuisance or health issue.
Soil Erosion and Sediment Control	Provides methods to control soil disturbance and runoff during excavation or pole setting.	Protects farmland and sensitive habitats from degradation during line construction.
Biodiversity Conservation	Aims to prevent disturbance to natural habitats and endangered species.	Important when lines pass through or near forests, wetlands, or protected areas in Rwanda.
Use of Pesticides and PCBs	Avoids use of hazardous substances like PCBs in transformers and recommends proper disposal.	Ensures new installations avoid legacy pollution and hazardous materials.
Electric and Magnetic Fields (EMF)	Suggests design practices to limit exposure to EMF and comply with international exposure limits.	Important for long-term health of residents and workers near transmission lines.
Emergency Preparedness and Response	Requires planning for fire, electrical incidents, and natural hazards with trained response teams.	Critical for managing accidents or natural events like lightning strikes or storms during operations.

EHS Guideline	Summary	Relevance
Visual Impacts and Land Use	Recommends minimizing visual disruption and negotiating land access with communities.	Helps maintain aesthetics of rural landscapes and avoids conflict over land acquisition.
Worker Accommodation and Welfare	Sets standards for worker housing, hygiene, and medical care on remote construction sites.	Important if camps are set up in isolated rural locations during construction.
Traffic Management	Provides guidance for vehicle movement and road safety near construction zones.	Reduces risk of accidents on narrow or unpaved rural roads.

2.6. 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 Transboundary Movements of Hazardous wastes and their disposal as adopted at Basel on 22 March 1989, and approved by Presidential Order No 29/01 of 24 August 2003 approving the membership of Rwanda;
- The Montreal International Conventional on Substances that Deplete the Ozone Layer, signed in London (1990), Copenhagen (1992), Montreal (1997), 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.

2.7. International agreements

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

Table 7: 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	22/03/1985	6/12/2002
5	Agreement of Ramsar related to humid zones of international importance, particularly the wild housing	02/02/1971	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.

2.8. Gap Analysis between Rwandan regulations and World Bank ESF/ESSS

Rwanda has developed and enacted different regulations governing environmental management and protection as well as regulations related to land acquisition and expropriation. Despite the effort made to improve the national regulations and align them with international standards, there is a number of gaps identified between the World Bank Environmental and Social Standards (ESSs) and national regulations, especially in terms on Land Acquisition, Restrictions on Land Use and Involuntary Resettlement (ESS5). The table below summarizes similarities and gaps between Rwanda regulations on environmental and social considerations and the World Bank Environmental and Social Standards.

Table 8: Differences between Rwanda regulations and World Bank Environmental and Social Framework/Standards/ESF/ESSs

ESF requirements	National Legal requirements	Gaps	Recommended Actions
Standard 1: Assessment and Management of Environmental and Social Risks and Impacts			
(i) To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs.	The Law 48/2018 of 13/08/2018 suggests a systematic process of identifying environmental, social and economic impacts of a project before a decision of its acceptance is made; .	The difference lies between the Project Classification according to levels of impacts while WB classifies into 4 categories (High, Substantial, Moderate and Low Risk), While the ministerial order No 001/2019 OF 15/04/2019 classifies projects in three categories after screening. (Project that must undergo full EIA, Partial EIA and no EIA for the project not listed in the Annex 1 and 2. Further, ESF classification is risk based while national classification is mainly size based.	All sub-projects would be screened as there might be some projects forgotten, but which have adverse environmental impacts
(ii) To adopt a mitigation hierarchy approach	The Rwandan Regulation does not specify the use of hierarchy, but it suggests that the mitigation measures should aim at preventing, eliminating or reducing the adverse effects on human health, natural resources and environment.	Although current national legislative framework seeks to avoid and mitigate social risks, there is no explicit directive to minimize impacts or to promote the adoption of a clearly defined mitigation hierarchy approach to managing social risks. In addition, the current system emphasizes cash compensation as a mitigation measure and hence does not address other losses.	ESS of the World Bank will be adopted during project implementation.
(iii) To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project.	The Constitution of Rwanda approves that the State has also the duty, within the limits of its means, to undertake special actions aimed at the welfare of the indigent, the elderly and other vulnerable groups.	The National Social Protection Policy defines a vulnerable individual or household who, for whatever reason, is less able to withstand socio-economic shocks and is therefore at an elevated risk of experience declines in welfare and or other forms of social deprivation. In the context of this strategy key vulnerable groups in Rwanda include low income and/or labour-constrained individuals	The vulnerability will be assessed based on country context and best practices and special attention will be provided to those identified as vulnerable

ESF requirements	National Legal requirements	Gaps	Recommended Actions
		or households such as older people, people with disabilities, female-headed households etc.	
(iv)To utilize national environmental and social Institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate.	There are various institutions systems, laws and regulations for the Environmental and Social management in the country	The mandated institutions have limited resources for the effective environmental and social implementation and with some exceptions, monitoring and compliance assessment is inadequate or absent.	ESS1 will be applied during project implementation to address this gap.
(v)To promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity	The Law suggests training and improving the capacity of the workforce while ensuring the protection of workers' rights in accordance with laws and international conventions ratified by Rwanda;	The law does not clearly define how they should be trained.	ESS1 will be applied during project implementation to address this gap.
Standard 2: Labour and Working Conditions			
(i)To promote safety and health at work.	Ministerial order N°2 of 17/05/2012 determining conditions for occupational and health safety aims to improve health, safety, and general wellbeing of workers and workplaces by promoting occupational health and safe practices in order to eliminate occupational accidents and diseases, hence achieve better productivity in the workplaces.	The similarity is evident.	The ESS shall be given priority during project implementation
(ii)To promote the fair treatment, non-discrimination and equal opportunity of project workers.	The working conditions in Rwanda are governed by the Law N° 66/2018 of 30/08/2018 regulating Labour and its implementing orders. This Law applies all aspect of labour be it formal and informal sectors and provides guidelines related to relationship between an employee and his/her employer in regard to: contract, wages and others benefits, working environment, working hours and different types of allowed leaves which the	The similarity is evident.	The implementation of the project will apply the ESS2

ESF requirements	National Legal requirements	Gaps	Recommended Actions
	employee is entitled to. This law also sets standards in terms of employment age and prohibits all form of forced labour, discrimination, and sexual harassment.		
(iii) To protect project workers, including vulnerable workers.	The law requires the protection of workers during employment	The enforcement is lacking, in part due to lack of budgeting and staffing, as well as the high unemployment in the country, which facilitates the exploitation of workers.	With the budgeting allocated for this project, harmony will be sought for both the ESS and the national requirements
(iv) To prevent the use of all forms of forced labour and child labour.	As (ii) in this section 2	As (ii) in this section 2	The ESS shall be given priority during project implementation
(v) To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law.	Article 39 of Rwandan Constitution as revised in 2015 suggests that the right to freedom of association is guaranteed and does not require prior authorization. This right is exercised under conditions determined by law.	The casual nature of employment affects unionization, as employees paid per day are unable to make the monthly check off in support of union activities.	The World Bank ESS2 that is stronger in terms of supporting the freedom of association will be adopted
Standard 3: Resource Efficiency and Pollution Prevention and Management			
(i) To promote the sustainable use of resources, including energy, water and raw materials.	The Law on the environment promote the sustainable use of the resources where in its Article 4 of Principle of environmental sustainability emphasizes that present and future generations enjoy equal opportunities. The right to development must be achieved in consideration of the needs of present and future generations.	The similarities are evident.	National regulations will be employed and any gaps with ESS3 will be filled with appropriate mitigation measures.
(ii) To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.	The Law on Environment in its Article 15 of Protection and conservation of the atmosphere suggests that any installation likely to create risks or cause pollution, vehicles and engine driven machines, commercial, craft or agricultural activities must be conducted in accordance with technical principles established by competent authorities in order to protect and preserve the atmosphere.	The National requirements are reinforced by the labour Law	The World Bank ESS3 will be employed as with most Bank funded projects for effectiveness of ESS 3.

ESF requirements	National Legal requirements	Gaps	Recommended Actions
(iii) To avoid or minimize project-related emissions of short and long-lived climate pollutants.	The article 26 of the Law on Environment orders to take necessary measures to protect and respect the obligations stipulated in international agreements which it signed; to prohibit any activity carried out on its behalf or in its capacity that may degrade the environment in another country or in regions beyond its national jurisdiction; to co-operate with other states in taking decisions to fight trans-boundary pollution; to protect, conserve and manage properly the environment using appropriate measures; while in its Article 50 establishes punishments.	The National requirements are reinforced by the Law	National regulations will be employed and any gaps with ESS3 will be filled with appropriate mitigation measures.
(iv) To avoid or minimize generation of hazardous and non-hazardous waste.	Article 19: Management of hazardous and toxic waste Any waste, especially from hospitals, health centres and clinics, research centres equipped with laboratories, industries and any other hazardous or toxic waste must be collected, treated and changed in a manner that does not degrade the environment in order to prevent, eliminate or reduce their adverse effects on human health, natural resources and environment. Management, disposal and trans-boundary movements of hazardous or toxic waste are governed by an order of the Minister.	The Law is enforced and the management to oversee that all kind of waste are well managed falls under RURA's responsibility while the management to restrict their entry fraudulently is taken care of by RSB (Rwanda Standards Board)	National regulations will be employed and any gaps with ESS3 will be filled with appropriate mitigation measures.
Standard 4: Community Health and Safety			
(i) To 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.	In Rwanda there is no specific law on community health and safety. Some provisions are included in environment law(2018) and Expropriation law(2015)	Project impacts on hosting community is not well articulated in national regulations. Only impacts on properties is granted.	The ESS4 that is more comprehensive standard will be applied regarding the anticipation and avoidance of adverse impacts on the health and safety of project-affected communities
Standard 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement			

ESF requirements	National Legal requirements	Gaps	Recommended Actions
Compensation should be provided to all Affected persons who: a) Have formal legal rights to land or assets; b) Do not have formal legal rights to land or assets, but have a claim to land or assets that is recognized or recognizable under national law; or c) Have no recognizable legal right or claim to the land or assets they occupy or use.	National regulations recognize Affected people who have land titles and documentary evidence that he/she is the owner of property incorporated on land. A person dispossessed of land or unlawfully occupying land or having developed activities on land on which such activities are prohibited after the enactment of relevant laws shall receive no compensation.	The Bank diverges with the Rwanda Law whereas the law in Rwanda refuses to recognize illegal landowners and does not provide any Compensation	ESS5 will apply and the compensation and resettlement measures should be provided to all affected person including those with no land title and tenants. Those who don't have legal right on the land will be compensated for assets and properties established on the land
The ESS5 requires the borrower to consider feasible alternative project designs to avoid or minimize land acquisition or restrictions on land use,	The national law on environment and ESIA procedures requires the developer to explore project alternatives but is silent about avoiding or minimizing involuntary resettlement.	While ESS5 requires the borrower to explore alternatives that avoid or minimize resettlement impacts, the national regulations only requires the provision of compensation	ESS5 will apply
When land acquisition or restrictions on land use (whether permanent or temporary) cannot be avoided, the ESS5 requires Borrower to offer affected persons compensation at replacement cost, and other assistance as may be necessary to help them improve or at least restore their standards of living or livelihoods.	The national Regulations (expropriation law, art 27) defines properties subject to valuation for the payment of fair compensation due to expropriation in the public interest are land, activities carried out on land for its efficient management or rational use and compensations for disruption caused by expropriation.	Loss of income is not covered under national regulations and regulations are silent on livelihood measures or assistance to vulnerable people	ESS5 will apply

ESF requirements	National Legal requirements	Gaps	Recommended Actions
ESS5 requires that the Borrower takes possession of acquired land and related assets only after compensation in accordance with this ESS has been made available and, where applicable, displaced people have been resettled and moving allowances have been provided to the displaced persons in addition to compensation.	Article 36 of the Expropriation law (2015) state that approved fair compensation shall be paid within a period not exceeding one hundred and twenty (120) days from the day of its approval. Subsequent to receiving fair compensation, the expropriated person shall have a period not exceeding one hundred and twenty (120) days to relocate.	The ESS5 requires providing compensation measures before land take while the national Regulations allows the project developer to take the land even before the compensation as long as the compensation is made in 120 days.	Compensation and provision of resettlement measures will be given prior land take and any construction works.
ESS5 requires the Borrower to engage with affected communities, including host communities, through the process of stakeholder engagement described in ESS10. Decision-making processes related to resettlement and livelihood restoration will include options and alternatives from which affected persons may choose.	Article 24 of expropriation law requires the District or City of Kigali administration or the relevant Ministry to inform the persons to be expropriated in the public interest of the expected start date of measurement of land and inventory of property incorporated thereon.	While the ESS5 requires consultation with affected communities and other stakeholders, the national regulations require only communication to the affected people.	ESS5 will apply and the RPF and RAP, if needed, will include requirements for stakeholder consultation and engagement
ESS5 requires borrowers to ensure that a grievance mechanism for the project is in place, in accordance with ESS10 as early as possible in project development to address specific concerns about compensation, relocation or	Article 33 of expropriation law state that within seven (7) days after the approval of the valuation report by the expropriator, any person to be expropriated who is not satisfied with the assessed value of his/her land and property incorporated thereon shall indicate in writing grounds for his/her dissatisfaction with the valuation report. Any person contesting the assessed value shall, at his/her own expense, engage the services of a	While ESS5 requires the establishment of Grievance Redress mechanism for the proposed project, National regulations provide only steps and timeframe for contesting valuation report	Grievance redress mechanism will be established at project level, district level and site level

ESF requirements	National Legal requirements	Gaps	Recommended Actions
livelihood restoration measures raised by displaced persons (or others) in a timely fashion.	valuer or a valuation firm recognized by the Institute of Real Property Valuers in Rwanda to carry out a counter-assessment of the value.		
Where land acquisition or restrictions on land use are unavoidable, the Borrower will, as part of the environmental and social assessment, conduct a census to identify the persons who will be affected by the project, to establish an inventory of land and assets to be affected, to determine who will be eligible for compensation and assistance, and to discourage ineligible persons, such as opportunistic settlers, from claiming benefits.	Article 10 of expropriation law requires the project developer to only prepare application that shall indicate: 1° the nature of the project; 2° the indication that the project aims at the public interest; 3° the master plan of land where the project will be carried out; 4° the document indicating that the project has no detrimental effect on the environment; 5° the document confirming the availability of funds for fair compensation; 6° the explanatory note detailing that such land or place suits the project; 7° the minutes indicating that the concerned population was sensitized about the project and its importance;	The measure gap in terms of planning and implementation is the absence of socio-economic assessment of project affected people and inventory of affected assets in the application report.	The socio-economic assessment of project affected people and inventory of affected assets will be part of the Resettlement Plan.
The social assessment will also address the claims of communities or groups who, for valid reasons, may not be present in the project area during the time of the census, such as seasonal resource users.	The social assessment is part of Environmental Impact assessment.	Regulations on land acquisition does not require social assessment.	Social assessment will be part of Resettlement Plan.
The Borrower will establish a cut-off date for eligibility.	The District or City of Kigali administration or the relevant Ministry must inform the persons to be expropriated in the public interest of the expected start date of measurement of land and inventory of property incorporated thereon.	The only gap identified is that the national regulations does not include warnings to the persons settling in the project area after the cut-off date may be subject to removal.	The cut-off date will be established and communicated to all affected people.

ESF requirements	National Legal requirements	Gaps	Recommended Actions
In the case of projects affecting livelihoods or income generation, the Borrower's plan will include measures to allow affected persons to improve, or at least restore, their incomes or livelihoods.	National Regulation are silent about economic displacement and does not provide any livelihood restoration program	Livelihood restoration and economic displacement are not considered under national regulations	Both physical and economic displacement will be considered and livelihood plan prepared as appropriate.
The Borrower will establish means of collaboration between the agency or entity responsible for project implementation and any other governmental agencies, subnational jurisdictions or entities that are responsible for any aspects of land acquisition, resettlement planning, or provision of necessary assistance.	Section one of the expropriation law provides the implementation arrangements for land acquisition from approving, implementation and implementation of decisions. Further, the land law of 2013 defines roles and responsibility of various stakeholders involved in land administration and expropriation.	No major gap identified apart from technical capacity of local entities that needs to be enhanced	ESIA and RAP to be prepared will provide implementation arrangement from national level to local level and the Resettlement plan will include a section on implementation arrangement
Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources			
(i) To protect and conserve biodiversity and habitats.	The article 28 on the Biodiversity conservation of the Law 48/2018 of 13/8/2018 on Environment emphasizes that the state has the responsibility to establish the list of species of animals and plants that must be protected depending on their role in ecosystems, their scarcity, their aesthetic value, their threat to extinction and their economic, cultural and scientific role; and to identify areas to be protected for conservation or rehabilitation of ecosystems, forests, woodlands, species of biodiversity and protected zones, monuments, historical sites and landscapes.	No major gap	National regulations will be employed and any gaps with ESS6 will be filled with appropriate mitigation measures.

ESF requirements	National Legal requirements	Gaps	Recommended Actions
(ii) Where biodiversity impacts are likely, apply mitigation hierarchy and precautionary approach in project design & implementation	The National Regulations do not emphasize the hierarchy.	Though the laws do not emphasize on the hierarchy, they agree on the principle of preventing any harm to biodiversity.	The ESS6 will be adopted to assess and manage Risks and Impacts on biodiversity under this project
(iii) To promote the sustainable management of living natural resources.	The chapter III regarding the conservation and protection of the environment of the Law on the environment above emphasizes that all natural resources should be protected from all kinds of degradation, and they must be used in a sustainable manner in accordance with relevant laws.	The implementation is highly variable as some implementers do not involve a multidisciplinary team to assess and adequately manage impacts.	National Regulations will be complemented by ESS6 will be adopted
(iv) To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities	National Regulation are silent about economic displacement and does not provide any livelihood restoration program	Livelihood restoration and economic displacement are not considered under national regulations	The ESS6 will be applied
Standard 8: Cultural Heritage			
(i) To protect cultural heritage from the adverse impacts of project activities and support its preservation.	The protection and preservation of culture heritage is governed by the Law N° 28/2016 of 22/7/2016 on The Preservation of Cultural Heritage and Traditional Knowledge The Article 15 of this law on Restrictions on classified heritage requires that, apart from routine tasks of maintaining cultural heritage, no person shall destroy, move, repair or modify in any way classified cultural heritage without prior written approval of the Minister within sixty (60) days from the date of receipt of the complete file. In case the Minister fails to reply within the prescribed period, the application is deemed	Chance finds procedures are not included in national regulations	ESS8 will apply and chance finds procedure.

ESF requirements	National Legal requirements	Gaps	Recommended Actions
	accepted. No person shall affix texts, images or install advertising signs on a historical monument or in its neighboring area.		
Standard 10: Stakeholder Engagement and Information Disclosure Consultants			
To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties.	The Law 48/2018 of 13/08/2018 on environment requires public hearings and consultation during Environmental studies.	The lack of legislation to guide the consultation of people on matters that affect them remains a big loophole in ensuring planning and budgeting of meaningful consultations. The Consultations required would be insufficient for the effective management of social risks on a project with significant impacts since it considers mainly environmental risks.	The ESS10 will be employed during project implementation.
To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance.	MO 001 of 15/04/2019 in its article 10 on public participation to express views on the environmental impact assessment report requires that the stakeholders may comment on the environmental impact assessment report and express views on the impacts of the proposed project. The authorized organ covers all costs of the public hearing process. The stakeholders' views are considered when selecting the best alternative of the project to be implemented.	The similarities are evident though the ESS10 provide more clarity.	National regulations will be employed and any gaps with ESS10 will be filled with appropriate mitigation measures.
(iii) To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.	The Expropriation law in public interest of 2015 in its article 6 requires that the initiator of an act aimed at the implementation of land use and development master plans shall first negotiate with owners of assets that are affected by the project. In case negotiations fail, formalities related to expropriation in the public interest shall be followed upon request of the expropriator and the initiator of the	During the project implementation Project affected People are engaged and the Grievance Redress Mechanism is established together with the committees at cell, sector, and district level. However, the implementation is hampered by the poor training and lack of means to help the committees to carry out the regular meetings and visits.	The ESS10 will be applied to promote effective inclusion of project affected parties in the implementation

ESF requirements	National Legal requirements	Gaps	Recommended Actions
	project, considering the interests of the person to be expropriated.		
(iv) To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.	Though the studies are disclosed, the law is silent about the disclosure of the Safeguards document.	No clear process for information disclosure in national environmental and social regulations	ESS10 will apply and public disclosure of all safeguard's instruments will be disclosed

Source: Consultant assessment based on WB ESF/ESS and national regulations

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 CO₂ 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 Eastern Province of Rwanda. The districts of intervention are respectively Nyagatare, Gatsibo, Kayanza, Ngoma, Kirehe, Bugesera and Rwamagana. 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 areas of interventions. 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 annexes of the report).

3.2 Project justification

The GoR 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 2029. 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 Eastern 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. 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.

d. Benefits to 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.

e. 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.

f. 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.

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 Eastern 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 components of the project in eastern province are summarized in the table below:

Table 9: Project key main components

S/N	Item	Data
1	Capacity of the MV	- 30kV

2	Capacity of the LV lines	- 0.4 kV
3	The height of the wooden/concrete poles to be used for stringing conductors,	- Height of LV poles is 9m - Height of MV wooden poles is 12m - Height of MV concrete and steel poles is 14m
4	Land area required for the installation of a single pole	- Required land area for pole installation is 0.5 m ² for LV lines and 1m ² for MV lines
5	The distance to be maintained between two poles	- Distance between two poles is 35m for LV lines and 70m for MV lines
6	The vertical and horizontal clearance requirements for MV and LV lines	- Horizontal clearance is 12m - Vertical clearance is 3m
7	The type of transformers to be installed	- Only poles mounted transformers will be installed

Source: REG_EDCL

The length of lines to be upgraded from single phase to three phase in Eastern province is 243,7km of Medium Voltage lines and 600km of Low Voltage lines. The length of Medium Voltage (MV) and Low Voltage (LV) lines to be constructed in the Eastern province, along with the number of transformers to be installed per district are also provided in the table below:

Table 10: Length of the MV and LV lines to be constructed and number of transformers to be installed

S/ N	District	Planned MV line (Km)	Planned LV line (Km)	Transformer s	Customer s
	Bugesera	56.19	362.15 km	102	10,229
	Gatsibo- Kayanza	195	631 km	168	21,800
	Kirehe- Ngoma	108	412 km	108	16,245
	Nyagatare	134	307.9 km	134	20,094
	Rwamagana	To be determined			
TOAL		493.19	1,731.05	512	68,368

Source; REG-EDCL

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 concrete 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 temporal 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 be made to avoid passing over the residential plots and other sensitive areas. However, there will be some restrictions in the Right of way for medium voltage such establishment residential building or planting trees under the electrical lines.

3.5.2 Project activities during the construction phase

a. Clearance of 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 for 12 meters width (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 within these 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. The design study will define the type and size of poles foundation based on standards established by REG as presented in the next table.

Table 10: Standard pole sizes

Application	Pole length	Min Diam. at 1.5m from Butt (mm)	Min Diam. at Pole Top (mm)	Planting Depth	Construction	Comment
LV light use	9m	200	150	1.5m	ABC	Intermediate poles
LV medium	9m	230	170	1.5m	ABC	Angle poles - supported
LV Stout	9m	285	190	1.5m	ABC	Angle pole - unsupported
LV and Street Lights	10m	210	150	1.6m	ABC	Road clearance and Street Lights
MV light use	12m	240	180	1.8m	Vertical	Rural lines, no LV under
MV medium	12m	260	195	1.8m	Vertical	Angle poles - supported
MV Stout	12m	320	200	1.8m	Vertical	Unsupported angle
Special use	14m	240	210	2.2m	Vertical	Special, long span
H-Pole	12m	240	195	1.8m	Horizontal	Special, Extra-long span
H-Pole	14m	260	220	2.2m	Horizontal	Special, Extra-long span

Source: REG, 2020

c. Installation of distribution 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. According to REG standards the distribution transformers:

- Are mounted on a two-pole structure made of steel or concrete poles. However, transformers up to 15

kVA can be mounted on a single pole structure if the limit state design has proven it is possible.

- Transformer voltage ratings (No-load): 30kV/400/230V and 15kV/400/230V
- The standard vector group: Dyn11 and
- Off load 5 position tap changer: 95%-97.5%-100%-102.5%-105%. Up to 25 kVA transformers, 3 positions tap changer may be used.

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 EDCL is 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 for ML lines (6 m each side). 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. 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 replacement of coolants and lubricants for transformers. However, this is not frequently done unless where it is required to be and in case of defects. EDCL indicated that the transformers containing PCBs are no longer used and permitted in Rwanda because of their toxicity against the environment and human beings.

3.5.4 Activities of the project during decommissioning phase

During the decommissioning phase, project activities will be mainly the 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. 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. The project also will rehabilitate the damaged sites to their former status or near what they were before the project was commissioned.

4. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE STATUS

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

4.1 General overview

Located in the eastern part of Rwanda, the province is characterized by lowlands which make up a major part of the eastern province. The topography of this region is by a depression of the relief, generally undulating between 1500 and 1100m of altitude. The rest of the region is made of plains a plain, swamps, and lakes of the Akagera National Park and Akagera wetlands complex with an altitude that varies between 900 m and 1,000m asl. The drainage region of the Akagera system influences the morphology of that area. The Akagera and its tributaries have deeply carved into the terrain. For the greatest part, the valley's floors are swampy (Henninger, 2013; Kirehe District, 2018). The largest part of eastern province is covered by Eastern savanna (large part of Nyagatare, Kayonza, Gatsibo, and Kirehe district) and Central Bugesera agro ecological zone. The savanna types include grass, shrub, tree, and woodland savannas, which are interlaced with minor forests such as shrub clumps, dry forests, gully forests, gallery forests, and riparian forests. The Eastern province host also the Akagera National Park. The Eastern lands with a flat topography and an altitude ranging between 1,400-1,600 m, receive the lowest rainfall, which is between 700- 950mm, and the annual average temperature ranges from 21 to 22°C (Rwanda Meteorological Agency (RMA), 2022).

The next sections provide environmental and social baseline information for each district of the eastern Province.

4.2. Nyagatare District

4.2.1. Physical environment

a. Location

Nyagatare District is among seven districts making the Eastern Province. It is sub-divided into 14 Sectors (Imirenge), 106 cells (Utugari) and 628 villages (Imidugudu) and spread over an area of 1,741 square kilometers making it the largest district of the country by area. The district borders with Uganda in the North, Tanzania in the East, and in the South by Gatsibo and by Gicumbi District in the West.

b. Topography

The district is in a granite low valley whose average altitude is 1513.5m from Mean Sea level (MSL). This kind of topography is favourable for an important district potentiality to undertake modern and mechanized agriculture. The topography is also characterized in general by low inclined hills separated by dry valleys.

c. Climate and rainfall

Nyagatare District experiences small quantity of rain and hot temperatures. According to 2009 district climate survey, Nyagatare District is subdivided into two main seasons: one long dry season that varies between 3 and 5 months with an annual average temperature varying between 25.3°C and 27.7°C. The distribution of the monthly rainfall varies from year to year. Annual rainfall 827 mm which is less compared to other regions in the country and very unpredictable to satisfy the needs in agriculture and livestock.

d. Geology and soils

Nyagatare is known for its fertile soils, cattle breeding and thereby dairy production, its industrial exploitation of granite and its close proximity to the National Park Akagera, which brings touristic opportunities. Nyagatare DDS will to build on the district potentialities to bring in economic transformation, social transformation and transformational governance. The soil of Nyagatare District is made by the tightness of the humifere layer of the soil brought about by the grassy savanna and by the vertisoils that are rich in nutrients mineral elements

but it lacks organic substances. These types of soils may be mainly exploited with the help of modern agricultural techniques and form sorts of artificial pastures camps for livestock.

e. Hydrography

Nyagatare District comprises of Umuvumba River that cut across the District, the Akagera and Umuyanja Rivers passing the district and constituting its limits with Tanzania and Uganda respectively, there is no other consistent river that can be exploited by the population in Nyagatare. The hydrographic network is very limited in the District of Nyagatare. Few of the rivers found there such as Nyiragahaya, Kayihenda, Karuruma, Nayagasharara and Kaborogota are erratic and intermittent. The weak river network constitutes a serious problem to respond to the needs of water for people and animals.

4.2.1 Ecological environment

Nyagatare District is characterized by a savannah ecosystem with drylands, open woodlands, and riverine habitats. It has diverse flora and fauna adapted to its semi-arid climate, with significant biodiversity influenced by Akagera National Park and the surrounding landscapes. The district is home to important plant and animal species, including large mammals, diverse birds, reptiles, and amphibians. Conservation efforts in Akagera National Park and wetland areas help to sustain biodiversity, though environmental challenges such as deforestation and human-wildlife conflict remain key issues to address.

a. Flora

The vegetation of Nyagatare District consists mainly of savannah grasslands, shrubs, and scattered trees. The dominant plant species include: **(i)** Grassland Species (Herbaceous Layer), such as *Hyparrhenia rufa* (Giant thatching grass), *Themeda triandra* (Red grass), *Panicum maximum* (Guinea grass), *Cymbopogon* spp. (Lemon grasses); **(ii)** Tree and Shrub Species such as *Acacia seyal* (Red acacia), *Acacia hockii*, *Acacia polyacantha* (White thorn), *Albizia gummifera*, *Balanites aegyptiaca* (Desert date), *Combretum molle* (Velvet bush willow), *Grewia bicolor* (False brandy bush), *Faidherbia albida* (Apple-ring acacia), *Commiphora africana* (African myrrh), *Terminalia brownie*, *Erythrina abyssinica* (Flame tree), **(ii)** Riverine and Wetland Vegetation. Along rivers such as Muvumba and in wetlands, vegetation includes: *Typha domingensis* (Cattail reeds), *Cyperus papyrus* (Papyrus sedge), *Phragmites mauritanus* (Reed grass), *Ficus sycomorus* (Sycamore fig), *Phoenix reclinata* (Wild date palm)

b. Fauna

Nyagatare's wildlife includes various mammals, birds, reptiles, and amphibians, many of which are found in Akagera National Park and its surrounding areas.

- Mammals

The dominant species in the district include *Loxodonta africana* (African elephant), *Syncerus caffer* (African buffalo), *Equus quagga boehmi* (Plains zebra), *Giraffa camelopardalis tippelskirchi* (Masai giraffe), *Ceratotherium simum* (Southern white rhinoceros) – reintroduced, *Panthera leo* (African lion) – reintroduced, *Leptailurus serval* (Serval cat), *Hippopotamus amphibius* (Hippopotamus), *Phacochoerus africanus* (Warthog), *Papio anubis* (Olive baboon), *Chlorocebus pygerythrus* (Vervet monkey), *Tragelaphus scriptus* (Bushbuck), *Tragelaphus strepsiceros* (Greater kudu), *Aepyceros melampus* (Impala), *Kobus ellipsiprymnus* (Waterbuck), *Sylvicapra grimmia* (Common duiker).

- Bird species

Nyagatare is rich in avian biodiversity, especially in Akagera National Park and wetland areas. Notable bird species include: *Balaeniceps rex* (Shoebill stork), *Anastomus lamelligerus* (African openbill), *Scopus umbretta* (Hamerkop), *Ciconia ciconia* (White stork), *Ardea goliath* (Goliath heron), *Bostrychia hagedash* (Hadada ibis), *Terathopius ecaudatus* (Bateleur eagle), *Haliaeetus vocifer* (African fish eagle), *Coracias caudatus* (Lilac-breasted roller), *Merops nubicoloides* (Southern carmine bee-eater), *Halcyon senegalensis* (Woodland kingfisher), *Numida meleagris* (Helmeted guineafowl), *Fringilla natalensis* (Natal francolin).

- Reptiles and amphibians

These include different species such as *Crocodylus niloticus* (Nile crocodile) – found in rivers and lakes, *Varanus niloticus* (Nile monitor lizard), *Python sebae* (African rock python), *Naja melanoleuca* (Forest cobra), *Bitis arietans* (Puff adder), *Agama agama* (Common agama), *Hyperolius viridiflavus* (Painted reed frog), *Xenopus laevis* (African clawed frog).

4.2.2 Socio-economic environment

a. Population

The 5th Rwanda Population and Housing Census (PHC5) has enumerated 653,861 residents in Nyagatare District, which represent 18.4% of the total population of the East Province (3,563,145 residents). The population of Nyagatare District is predominantly female: 335,121 corresponding to 51.3 % of its total population. Females are predominant in all 14 sectors of the district. Karangazi (96,915 population), Rwimiyaga (82,620 population) and Nyagatare (81,915 Population) are the most populated sectors. They represent 14.8% 12.6 and 12.5% of the total population of Nyagatare District. The two less populated sectors are Kiyombe (18,801 inhabitants) and Mukama (25,659 inhabitants). They represent 2.9% and 3.9% of the total resident population of Nyagatare District, respectively.

Table 11: Population of Nyagatare 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	
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	
Nyagatare	653,861	318,740	335,121	100	48.7	51.3	100
Gatunda	35,310	16,767	18,543	100	47.5	52.5	5.4
Karama	32,949	15,627	17,322	100	47.4	52.6	5
Karangazi	96,915	48,020	48,895	100	49.5	50.5	14.8
Katabagemu	43,719	21,082	22,637	100	48.2	51.8	6.7
Kiyombe	18,801	8,956	9,845	100	47.6	52.4	2.9
Matimba	28,487	13,771	14,716	100	48.3	51.7	4.4
Mimuri	34,373	16,490	17,883	100	48	52	5.3
Mukama	25,659	12,341	13,318	100	48.1	51.9	3.9
Musheri	37,343	18,268	19,075	100	48.9	51.1	5.7
Nyagatare	81,915	40,775	41,140	100	49.8	50.2	12.5
Rukomo	43,650	20,892	22,758	100	47.9	52.1	6.7
Rwempasha	38,592	19,234	19,358	100	49.8	50.2	5.9
Rwimiyaga	82,620	40,685	41,935	100	49.2	50.8	12.6
Tabagwe	53,528	25,832	27,696	100	48.3	51.7	8.2

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

The results of Rwanda Population and housing census 2022 revealed that, the total population of Rwanda are spatially distributed in rural area that represent 72.1% and urban area represent 27.9%. The East Province is predominantly rural (79.1%). Nyagatare District population is also predominantly rural 75.9% while rural represents 18.8%. The sectors of Nyagatare District which are entirely rural are Gatunda, Katabagemu, and Kiyombe.

b. Number of households and size of household

The results of 5thRPHC 2022 indicate that there is a total of 160,435 households in Nyagatare District. The average household size in Nyagatare District is 4.1 persons per household. At the Sector level, the highest sizes are found in Musheri (4.4 persons/household) and Rwimiyaga (4.3 persons/household). The smallest household sizes are found in Mimuri (3.7 persons/household). In Nyagatare District, private households headed by females are 27.9%. At sector level, the highest percentages of households headed by women are

found in Matimba sector (32.3%) Gatunda (30.4%) and Karama sector (30.2%) while the lowest is found in Rwimiyaga sector (25.6%).

Table 12: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ¹	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
East Province	886,132	3,521,227	4.0	70.4	29.6
Nyagatare District	160,435	650,838	4.1	72.1	27.9
Gatunda	9,140	35,246	3.9	69.6	30.4
Karama	8,262	32,866	4.0	69.8	30.2
Karangazi	23,195	96,369	4.2	72.3	27.7
Katabagemu	10,819	43,686	4.0	73.0	27.0
Kiyombe	4,820	18,787	3.9	73.8	26.2
Matimba	7,113	28,388	4.0	67.7	32.3
Mimuri	9,196	34,337	3.7	71.3	28.7
Mukama	6,709	25,624	3.8	73.0	27.0
Musheri	8,532	37,301	4.4	72.5	27.5
Nyagatare	20,739	80,628	3.9	73.3	26.7
Rukomo	10,916	43,605	4.0	70.8	29.2
Rwempasha	9,139	38,485	4.2	72.0	28.0
Rwimiyaga	19,261	82,053	4.3	74.4	25.6
Tabagwe	12,594	53,463	4.2	71.7	28.3

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

c. Housing characteristics

The results of 5th Population and Housing Census 2022 revealed that in the East Province the predominant type of habitat is Umudugudu planned Rural settlement (86.5%) and Dispersed/ Isolated housing (7.4%). The most common type of habitat in Nyagatare District is also planned Rural settlement (84.4%) followed by Dispersed/ Isolated housing (10.5%) and Spontaneous/squatter housing (2.3%). The type of habitat does not vary across sectors since they are predominantly rural. Planned Rural settlement is most prevalent in all Sectors of Nyagatare, very high in Karama (97%) and Gatunda (68.7%) and low in Rwempasha (53.8%). The sectors with the highest percentages of dispersed/isolated housing units are Rwempasha (26.9%).

Table 13: Distribution of households in Nyagatare District by type of habitat

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
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Nyagatare	160,435	100	84.4	0.3	1.7	10.5	0.3	2.3	0.5	0.0
Nyagatare -Urban	40,099	100	89.1	0.3	1.8	5.0	1.1	2.3	0.3	0.0
Nyagatare - Rural	120,336	100	82.8	0.3	1.6	12.3	0.0	2.3	0.6	0.0

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
Gatunda	9,140	100	96.3	0.2	0.1	3.2	0.0		0.1	0.0
Karama	8,262	100	97.0	0.1		2.6		0.0	0.2	0.0
Karangazi	23,195	100	71.5	0.2	3.7	18.9	0.1	5.0	0.6	0.0
Katabagemu	10,819	100	94.8	0.1	0.4	4.5	0.0	0.0	0.1	0.0
Kiyombe	4,820	100	84.7	0.1		14.9		0.2	0.0	0.0
Matimba	7,113	100	84.4	0.2	1.5	12.8	0.1	0.9	0.1	0.0
Mimuri	9,196	100	96.8	0.2	0.0	2.6	0.0	0.3	0.1	0.0
Mukama	6,709	100	86.6	0.2	0.0	9.0	0.0	4.1	0.0	0.0
Musheri	8,532	100	82.4	0.1	1.9	14.6	0.0	0.8	0.3	0.0
Nyagatare	20,739	100	87.2	0.6	2.3	5.5	2.2	1.0	1.1	0.0
Rukomo	10,916	100	93.9	0.0	0.4	5.5	0.0	0.1	0.0	0.0
Rwempasha	9,139	100	53.8	0.4	5.1	26.9	0.0	11.5	2.2	0.0
Rwimiyaga	19,261	100	84.2	0.5	2.1	11.0	0.0	1.6	0.6	0.0
Tabagwe	12,594	100	83.0	0.7	1.0	11.3	0.1	3.4	0.4	0.0

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

By area of residence, the predominant type of habitat in Nyagatare district is the same in both urban Rural areas, the predominant types are planned Rural settlement (89.1% and 82.8% respectively) and Dispersed/Isolated housing is the second most predominant, (5% and 10.5% respectively).

d. Education

The results of 5RPHC-2022 indicate that, among the population aged 3 years and above in Nyagatare district is 589,280 in Nyagatare District, 19.8% of them has never attended any formal school, 59.5% attained the primary level, 9% attained lower secondary level, 5.8% has attended upper secondary and 2.1% attended university level. The level of educational attainment varies across sectors, Gatunda is highest percentage of primary school attainment (62.2%), Matimba is highest in upper secondary school attainment (7.8%), and Nyagatare has a high percentage of 6.3% of the population attended University than other sectors.

Table 14: Distribution (Count and %) of the resident population of Nyagatare District aged 3 and above by highest level of school attended by sector (Both sexes).

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
Rwanda	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Nyagatare District	589,280	100	19.8	3.3	59.5	0.4	9.0	5.8	2.1	0.0
Gatunda	31,754	100	17.1	3.2	62.2	0.5	9.6	5.5	1.8	0.0
Karama	29,576	100	20.5	3.2	61.1	0.5	8.6	4.9	1.2	0.0
Karangazi	87,761	100	22.9	3.1	57.2	0.3	8.8	6.0	1.6	0.0
Katabagemu	39,242	100	19.6	3.4	62.0	0.4	9.0	4.5	1.2	0.0
Kiyombe	17,014	100	15.9	2.5	65.0	0.7	9.1	5.7	1.1	0.0
Matimba	25,855	100	18.0	4.3	56.6	0.4	10.5	7.8	2.4	0.0
Mimuri	31,232	100	21.6	3.0	61.6	0.4	7.5	4.5	1.4	0.0
Mukama	23,175	100	19.5	3.0	63.2	0.3	8.6	4.5	0.9	0.0

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
Musheri	33,401	100	21.2	2.2	62.0	0.3	8.2	4.9	1.2	0.0
Nyagatare	74,289	100	18.1	4.0	54.1	0.6	9.3	7.6	6.3	0.0
Rukomo	38,926	100	16.1	3.0	61.2	0.4	10.9	6.3	2.0	0.0
Rwempasha	34,730	100	20.1	3.5	58.0	0.4	9.8	6.5	1.7	0.0
Rwimiyaga	74,587	100	21.0	3.5	59.8	0.3	8.5	5.7	1.2	0.0
Tabagwe	47,738	100	20.2	3.7	61.0	0.3	8.8	4.9	1.2	0.0

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

e. Means of livelihoods

The results of 5th RPHC 2022 revealed that nationally, 2,280,854 of private households (68.9%) are engaged in agriculture, among them 62.6% are engaged in crop farming and 50.4% are engaged in Livestock husbandry. In Nyagatare District, Agricultural households occupy (66.3%) with 59.3% of households engaged in crop farming and 39.2% Households engaged in Livestock husbandry. Nyagatare District is mostly rural where the agriculture activities are practiced on high scale. Kiyombe sector has a high proportion of Households engaged in crop farming (84.7%) and Households engaged in Livestock husbandry (60.5%).

It was also revealed that the employment to population ratio is 51.5% among people residing in Nyagatare district, it is higher in urban areas of Nyagatare (54.0%) than in rural areas of Nyagatare (48.7%). Early entry and late exit to the labour market in Nyagatare District were around 25.3% at age 16 (the official age for entry into the labour market) and above 43.4% at 60 years (official age of retirement). Labor force participation is intense between ages 25 and 60 with an average of 63.3% of male and 49.3% of female population in labor market. Important gender disparities are remarkable in labor force participation at all age groups; males contribute more than females to labor force.

Table 15: Distribution of household engaged in livestock husbandry in Nyagatare District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,92	62.6	1,669,273	50.4
East Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Nyagatare District	160,435	106,284	66.3	95,168	59.3	62,907	39.2
Gatunda	9,140	7,143	78.2	6,299	68.9	5,003	54.7
Karama	8,262	6,530	79.0	6,036	73.1	4,029	48.8
Karangazi	23,195	14,977	64.6	13,693	59.0	8,055	34.7
Katabagemu	10,819	7,675	71.0	6,873	63.5	4,375	40.4
Kiyombe	4,820	4,082	84.7	3,817	79.2	2,916	60.5
Matimba	7,113	4,141	58.2	3,552	49.9	2,519	35.4
Mimuri	9,196	6,028	65.6	5,298	57.6	3,349	36.4
Mukama	6,709	5,245	78.2	4,778	71.2	3,530	52.6
Musheri	8,532	5,765	67.6	5,064	59.4	3,446	40.4
Nyagatare	20,739	10,804	52.1	9,457	45.6	5,974	28.8
Rukomo	10,916	7,647	70.1	6,711	61.5	4,794	43.9
Rwempasha	9,139	5,614	61.4	5,063	55.4	3,369	36.9

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwimiyaga	19,261	11,911	61.8	10,466	54.3	6,818	35.4
Tabagwe	12,594	8,722	69.3	8,061	64.0	4,730	37.6

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

f. Health, Water supply and Sanitation facilities

In Nyagatare District 96.3% are using Mutuelle as main health insurance, 2.5% using RSSB or RAMA, 0.1% using private insurance, 0.1% using school insurance, 0.1% using NGOs insurance and 1% using employer insurance.

The results of 5RPHC 2022 reveal that improved water source is the most water sources in Rwanda that represent (82.3%). In Nyagatare District, 78% of private households use improved water sources. At the sector level, the percentage of the private households using water from improved sources is highest in Rukomo (99.9%), and the lowest in Kiyombe (56.9%).

In Nyagatare District, both urban and rural areas, private households use mainly improved source of water (90.6% in urban and 73.9% in rural). The percentage of private households using unimproved source of water is higher in rural (26.1%) than in urban (9.4%).

g. Appliance and assets ownership

At the district level, 81.9% of private households possess a radio, 78.9% a mobile phone, 14.9% a smartphone, 8.5% a TV and 1.7% a computer. The percentage of private households possessing a radio is high in Matimba (87.7%), Nyagatare (86.3%), and Rwempasha (84.3%). It is low in Mimuri (72.7%). The percentage of private households possessing a television is high in Nyagatare (13.9%) and Matimba (12.3%) while it is low in (Kiyombe (2.4 %). Mobile phone is mostly possessed by private households of Matimba and Nyagatare (85.1% and 84.3% each), followed by Rwempasha (82.2%). The sectors with high percentage of households with smartphone are Nyagatare (27.1%), and Matimba (20.4%) while the percentage of households possessing this asset is low in Mukama (7.3%). The computer is mostly possessed in Nyagatare (4.6%).

Table 16: Percentage of private households and of Nyagatare 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
East Province	886,132	80.3	9.3	76.5	16.4	2.1
Nyagatare	160,435	81.9	8.5	78.9	14.9	1.7
Gatunda	9,140	79.0	5.9	75.1	12.9	1.8
Karama	8,262	78.7	5.4	75.4	10.3	0.8
Karangazi	23,195	83.7	10.1	81.0	15.7	1.4
Katabagemu	10,819	80.0	5.6	75.6	10.6	0.8
Kiyombe	4,820	81.8	2.4	76.1	9.9	0.8
Matimba	7,113	87.7	12.3	85.1	20.4	2.2

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
Mimuri	9,196	72.7	5.9	67.6	10.5	1.5
Mukama	6,709	73.5	3.4	68.7	7.3	0.7
Musheri	8,532	80.4	6.6	78.0	12.0	1.0
Nyagatare	20,739	86.3	13.9	84.3	27.1	4.6
Rukomo	10,916	82.1	9.3	78.5	15.5	1.9
Rwempasha	9,139	84.3	11.7	82.2	14.3	1.1
Rwimiyaga	19,261	83.5	8.7	81.7	13.6	0.9
Tabagwe	12,594	82.0	6.3	79.0	10.8	1.0

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

h. Access to energy for lighting and cooking

In Nyagatare District, the main source of energy for lighting used by households is electricity (54.5%). At the sector level, the percentage of households using electricity for lighting is high in Matimba (68.6% each), Rukomo (63.9%), Nyagatare (63.8%) and Karama (62.5%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Katabagemu (47.7%), Rwempasha and Tabagwe (43.4%).

The sources of energy for lighting in Nyagatare District are mainly electricity, flashlight/phone flashlight and candles. However, the percentages of households using them vary by area of residence. In urban areas, the main source of energy for lighting is electricity (66.7%), followed by flashlight/phone flashlight (26%) and candles (3.2%). In rural areas, 50.6% of private households use electricity as main source of energy for lighting while 40.6% use flashlight and 2.6% use candles.

Table 17: Distribution of households of Nyagatare District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/ Paraffin	Biogas	Candles	Firewood	Batteries/ Bulb	Flashlight /Phone	Recharge able	Other source of
Rwanda	3,312,743	100	61.0	0.4	0.0	2.9	4.2	1.1	28.4	0.1	1.7
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	2.3
Nyagatare	160,435	100	54.5	0.3	0.0	2.7	1.5	2.3	37.0	0.1	1.6
Nyagatare -Urban	40,099	100	66.7	0.3	0.1	3.2	1.0	1.5	26.0	0.1	1.1
Nyagatare -Rural	120,336	100	50.5	0.3	0.0	2.6	1.6	2.6	40.6	0.1	1.7
Gatunda	9,140	100	58.9	0.1	0.0	1.4	1.6	1.3	35.2	0.1	1.2
Karama	8,262	100	62.5	0.2	0.0	2.5	1.7	1.5	30.1	0.1	1.4
Karangazi	23,195	100	46.4	0.3	0.2	3.0	1.2	5.0	41.9	0.2	1.8
Katabagemu	10,819	100	44.7	0.3	0.0	2.1	1.7	2.1	47.7	0.2	1.3
Kiyombe	4,820	100	52.6	0.1	0.0	2.1	2.4	1.0	40.9	0.2	0.8
Matimba	7,113	100	68.6	0.7	0.0	3.5	0.8	1.1	23.8	0.1	1.4
Mimuri	9,196	100	60.3	0.3	0.0	3.7	1.1	1.2	32.0	0.1	1.2
Mukama	6,709	100	58.0	0.5	0.0	1.6	1.3	1.0	36.5	0.1	0.9
Musheri	8,532	100	53.1	0.4	0.0	3.3	2.4	2.5	35.9	0.1	2.3
Nyagatare	20,739	100	63.8	0.3	0.0	3.1	1.1	1.6	29.1	0.1	1.0
Rukomo	10,916	100	63.9	0.3	0.0	3.2	1.0	2.9	27.2	0.2	1.2
Rwempasha	9,139	100	47.6	0.4	0.0	3.3	1.1	2.2	43.4	0.1	1.9
Rwimiyaga	19,261	100	48.7	0.3	0.0	2.1	1.8	2.4	42.2	0.1	2.5
Tabagwe	12,594	100	47.6	0.3	0.0	2.8	1.8	1.8	43.4	0.1	2.1

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 (83.6%) followed by charcoal (7.1%) and crop waste (5.6%). At the sector level, firewood is the most used source of cooking energy by private households. It is very high in Kiyombe (95.8%) and Mukama (94.9%). Sectors with the high percentage of private households using charcoal are Nyagatare (18.8%), Matimba (9.2%) and Rwimiyaga (8.5%). Sectors with the highest percentages of private households using crop waste as main source of cooking energy are Katabagemu (17.4%), Musheru (11.2%) and Tabagwe (9.9%).

The main sources of energy for cooking used by private households in Nyagatare District vary by area of residence. In Rural areas, private households use mostly firewood (88.6%) and crop waste (6.2%). In urban areas, private households use most firewood (68.4%) and charcoal (19.4%).

i) Vulnerability

In Nyagatare District the disability prevalence rate is 3.7%. At sector level, the highest prevalence rates of the resident population with vulnerability are in Kiyombe (4.7%) and Matimba (4.5%) while the lowest is in Tabagwe and Nyagatare (3.1% and 3.2%) respectively.

Table 18: Number and share (%) of persons with vulnerability by Sector of residence and sex

Sectors of residence	Total resident population	Person's with Vulnerability			Prevalence of Vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Nyagatare District	559,870	20,631	9,346	11,285	3.7
Gatunda	30,329	1,184	508	676	3.9
Karama	28,215	1,161	533	628	4.1
Karangazi	82,648	2,795	1,257	1,538	3.4
Katabagemu	37,454	1,604	734	870	4.3
Kiyombe	16,411	773	329	444	4.7
Matimba	24,383	1,108	493	615	4.5
Mimuri	29,686	985	443	542	3.3
Mukama	22,230	786	378	408	3.5
Musheru	32,112	1,148	550	598	3.6
Nyagatare	70,276	2,257	1,040	1,217	3.2
Rukomo	37,542	1,461	658	803	3.9
Rwempasha	32,941	1,111	505	606	3.4
Rwimiyaga	70,301	2,834	1,225	1,609	4.0
Tabagwe	45,342	1,424	693	731	3.1

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

Regarding the prevalence of disability among the population age 5 years and above by type of disability, (1.40%) have a disability of seeing followed by Walking (1.10%). The table below indicates that in Nyagatare district the prevalence of disability of seeing is at 1.5% while the prevalence disability of walking is 1.0%.

4.3. Gatsibo District

4.3.1. Physical environment

a. Location

Gatsibo District is one of the seven Districts making the Eastern Province. It is divided into 14 Sectors which are: Gasange, Gatsibo, Gitoki, Kabarore, Kageyo, Kiramuruzi, Kiziguro, Muhura, Murambi, Ngarama, Nyagihanga, Remera, Rugarama and Rwimbogo. It is also divided into 69 cells and 603 villages "Imidugudu". Spreading an area of 1585.3 km². The district borders with the Akagera National Park in East, Gatsibo District in North, Gicumbi District in Western and in South by Gatsibo and Kayanza Districts.

b. Topography

The relief of Gatsibo District is characterized by scarcely short hills and flat land separated by valleys in East, South East and North, while at the West and South West is characterized by high mountains in its administrative sectors of Nyagihanga, Kageyo, Gatsibo, Muhura, Gasange and Remera. Gatsibo District is characterized in general by low inclined hills and flat land separated by dry allies. The District is located in the granite low valley whose average altitude is 1550m spread on the plateau and the savannah of the Eastern part of the country. This kind of topographical layout constitutes an important potentiality for modern and mechanized agricultural farming. This relief offers to Gatsibo a vocation agro pastoral and tourism.

c. Climate and Rainfall

Gatsibo district experiences small quantity of rains and hot temperatures. It is characterized by two main seasons: one long dry season that varies between 3 and 5 months with an annual overage temperature varying between 25,3oC and 27,7oC. The monthly distribution of the rains varies from one year to another. Annual rainfalls are both very weak (827 mm/an) and very unpredictable to satisfy the needs in agriculture and livestock.

d. Geology and Soils

District is characterized by an abundance of the humus-bearing grounds ferralisols one originating laterite of the deterioration of the shales and phyllites, accumulation of the collisions in the valleys dry Martini. The ground of granite origin cuts has texture with little red clay especially in the South-West of the District. The termite mounds cover the biggest part of the district. The combined action of the lithosphere (rock and roll mother granite), atmosphere (rains), and biosphere (man and the other living beings) developed deep grounds drank of which the fertility by the drought of the more stressed climate by drying out winds blowing East. Thus, the xérokaolisols in the party remains the ground type the more dominating. To the surface, they identify themselves by the narrowness of to bush-hammer humus-bearing brought by the grassy savannah. The grounds of Gatsibo District contain Minerals such as the Cassiterite, the Colombo-tantalite, the wolfram, etc. they also contain ores of construction materials like the gravel, sand, hardcore, clay, etc.

e. Hydrography

Gatsibo District is known of the low rainfall and high temperatures that limit the availability of water. The hydrography of Gatsibo District is largely constituted of streams and rivers such as; Warufu, Karungeri, Cyamuganga, Kanyonyomba, Rwangingo, Kabahanga, Kagina, Kagende Rwagitima and Ntende. This hydrographic network combined with the aforementioned relief offers timeliness of irrigation in the district.

4.3.2. Ecological environment

Gatsibo District hosts a rich biodiversity of flora and fauna, primarily influenced by the Akagera ecosystem. The district's environment consists of savanna vegetation, wetlands, and farmlands that support a variety of plants, mammals, birds, reptiles, and aquatic species.

a) Flora

The vegetation of Gatsibo District is mainly characterized by savanna woodlands, grasslands, and wetlands. The dominant plant species include: (i) **Trees and Shrubs** such as *Acacia senegal* (Gum Arabic tree), *Acacia polyacantha* (White thorn), *Faidherbia albida* (Apple-ring Acacia), *Albizia gummifera* (Peacock Flower Tree), *Balanites aegyptiaca* (Desert Date), *Combretum molle* (Velvet Bushwillow), *Terminalia brownii* (East African Terminalia), (ii) **Grasses** such as *Hyparrhenia rufa* (Jaragua Grass), *Themeda triandra* (Red Grass), *Panicum maximum* (Guinea Grass), *Cymbopogon nardus* (Citronella Grass).

The district has also wetlands, including marshlands and areas close to rivers such as Akagera. These ecosystems support: different species such as *Cyperus papyrus* (Papyrus reed), *Typha domingensis* (Cattail), *Phragmites mauritianus* (Common Reed), *Eichhornia crassipes* (Water Hyacinth, invasive species). Due to human activities, cultivated land is dominant, with crops such as: (i) **Food Crops:** Maize (*Zea mays*), Beans (*Phaseolus vulgaris*), Sorghum (*Sorghum bicolor*), Cassava (*Manihot esculenta*) (ii) **Fruit Trees:** Mango (*Mangifera indica*), Avocado (*Persea americana*), Banana (*Musa spp.*), (iii) **Planted Forests:** *Eucalyptus camaldulensis* (Eucalyptus), *Pinus patula* (Patula Pine), *Grevillea robusta* (Silky Oak)

b) Fauna

The district shares part of its fauna with the Akagera National Park and surrounding savanna landscapes. The major wildlife includes:

c) Mammals

These include (i) **Large Mammals such as** *Loxodonta africana* (African Elephant), *Syncerus caffer* (African Buffalo), *Hippopotamus amphibius* (Hippopotamus), *Ceratotherium simum* (Southern White Rhinoceros), *Giraffa camelopardalis tippelskirchi* (Masai Giraffe), *Equus quagga boehmi* (Plains Zebra); (ii) **Predators:** *Panthera leo* (African Lion), *Leptailurus serval* (Serval Cat), *Canis mesomelas* (Black-backed Jackal), *Crocuta crocuta* (Spotted Hyena) and (iii) **Small Mammals:** *Atilax paludinosus* (Marsh Mongoose), *Orycteropus afer* (Aardvark), *Hystrix cristata* (Crested Porcupine).

d) Bird species

Gatsibo hosts a variety of bird species, especially in the wetland areas near Akagera. Common species include: *Balearica regulorum gibbericeps* (Grey Crowned Crane), *Scopus umbretta* (Hamerkop), *Anhinga rufa* (African Darter), *Ardea goliath* (Goliath Heron), *Tockus nasutus* (African Grey Hornbill), *Bucorvus leadbeateri* (Southern Ground Hornbill), *Halcyon chelicuti* (Striped Kingfisher).

c) Reptiles and amphibians

These include (i) **Reptiles** such as **Crocodylus** *niloticus* (Nile Crocodile), *Varanus niloticus* (Nile Monitor), *Python sebae* (African Rock Python), *Naja melanoleuca* (Forest Cobra), (ii) **Amphibians:** *Xenopus laevis* (African Clawed Frog), *Hyperolius viridiflavus* (Variable Reed Frog).

d) Fish and aquatic life

Water bodies in the district support fish such as: *Oreochromis niloticus* (Nile Tilapia), *Clarias gariepinus* (African Catfish), *Protopterus aethiopicus* (African Lungfish).

4.3.3. Socio-economic characteristics

a. Population

The results in Table 1 indicates that 551,164 residents were enumerated in Gatsibo district, and the population share is 15.5% of the total population of the Eastern Province. The population of Gatsibo district is predominantly female: 286,703 are women corresponding to 52.0 % of its total population. Females are predominant all sectors the district. The most populated sector is Kabarore with 13.0% of the total population of the district. The two less populated sectors are Gasange and Kageyo (20,725 residents and 24,702 residents respectively). They represent 3.8% and 4.5% of the total resident population of Gatsibo district, respectively.

Table 19: Population of Gatsibo 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	
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Gatsibo district	551,164	264,461	286,703	100	48	52	100
Gasange	20,725	10,054	10,671	100	48.5	51.5	3.8
Gatsibo	40,940	19,618	21,322	100	47.9	52.1	7.4
Gitoki	43,414	20,690	22,724	100	47.7	52.3	7.9
Kabarore	71,769	34,598	37,171	100	48.2	51.8	13
Kageyo	24,702	11,849	12,853	100	48	52	4.5
Kiramuruzi	40,028	19,099	20,929	100	47.7	52.3	7.3
Kiziguro	39,757	18,924	20,833	100	47.6	52.4	7.2
Muhura	33,325	16,046	17,279	100	48.2	51.8	6
Murambi	38,498	18,436	20,062	100	47.9	52.1	7
Ngarama	38,006	18,353	19,653	100	48.3	51.7	6.9
Nyagihanga	28,812	13,858	14,954	100	48.1	51.9	5.2
Remera	31,771	15,122	16,649	100	47.6	52.4	5.8
Rugarama	49,442	23,625	25,817	100	47.8	52.2	9
Rwimbogo	49,975	24,189	25,786	100	48.4	51.6	9.1

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

The results from the 5th Rwanda Population and housing census reveal that, the population of Rwanda are predominantly distributed in rural areas that represent 72.1% of resident population compared to 27.9% in urban areas. The population in Eastern Province is predominantly rural (79.1%) comparatively to urban areas (20.9%). The same trend is observed at district level (Gatsibo) where, the population in that district mostly found to live in rural areas (90%) compared to urban areas (10%). Results presented in Table 1. 3 Distribution (Count and %) of Resident Population of Gatsibo district by sector and Area of Residence in 2022 show that, sectors namely: Gasange, Kageyo, Muhura, Murambi, Nyagihanga and Remera are entirely rural sectors of Gatsibo district.

b. Number of households and size of household

The results of the 5th RPHC 2022 indicate the total of 136,208 private households in Gatsibo district. The average household size in Gatsibo district is 4.0 persons per household. At the Sector level, the highest sizes are found in Gasange and Gatsibo Sectors (4.3 persons/household each). The smallest household sizes are found in Nyagihanga and Ngarama (3.8 persons/household each). The results of the 5th RPHC 2022 revealed that 28.9% of private households are headed by women at national level. In Gatsibo district, private households headed by females are 29.3%. At sector level, the highest percentages of households headed by women are found in Kiramuruzi Sector (34.5%) and Gatsibo Sector (34.3%) while the lowest are found in Muhura.

Table 20: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ¹	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
Eastern Province	886,132	3,521,227	4.0	70.4	29.6
Gatsibo district	136,208	549,737	4.0	70.7	29.3
Gasange	4,843	20,714	4.3	75.7	24.3

Gatsibo	9,521	40,769	4.3	65.7	34.3
Gitoki	10,846	43,379	4.0	71.3	28.7
Kabarore	17,334	71,523	4.1	70.9	29.1
Kageyo	6,294	24,672	3.9	74.3	25.7
Kiramuruzi	10,194	39,989	3.9	65.5	34.5
Kiziguro	9,993	39,713	4.0	66.3	33.7
Muhura	8,362	33,285	4.0	75.1	24.9
Murambi	9,225	38,480	4.2	70.3	29.7
Ngarama	9,714	37,300	3.8	72.1	27.9
Nyagihanga	7,531	28,795	3.8	75.8	24.2
Remera	8,077	31,747	3.9	69.7	30.3
Rugarama	12,486	49,427	4.0	69.1	30.9
Rwimbogo	11,788	49,944	4.2	73.0	27.0

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

c. Housing characteristics

Results from the 5th Rwanda Population and Housing Census 2022 revealed that, in Eastern Province the predominant type of habitat is Planned rural settlement also known as umudugudu settlement (86.5%) and Dispersed/Isolated housing (7.4%). The same trend is observed at district level, where the most common type of habitat in Gatsibo district is umudugudu settlements (80.5%) and Dispersed/Isolated housing (13.8%). Results presented in Table 4 show that the type of habitat varies across all sectors in Gatsibo district. Umudugudu settlement is the most prevalent type of habitat in Rwimbogo (93.0%) Rugarama (89.5%), and Nyagihanga (88.4%) Kiziguro sector (87.5%). Sectors with the highest percentages of dispersed or isolated housing units are: Muhura (30.4%) followed by Gasange (23.3%) and Gitoki (20.3%).

Table 21: Distribution of households in Gatsibo District by type of habitat

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
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Gatsibo district	136,208	100	80.5	0.5	1.0	13.8	0.1	2.6	1.5	0.0
Gatsibo Urban	14,325	100	86.0	0.8	0.6	7.6	1.2	3.1	0.6	0.0
Gatsibo Rural	121,883	100	79.9	0.5	1.0	14.5	0.0	2.6	1.6	0.0
Gasange	4,843	100	75.8	0.1	0.2	23.3	-	0.6	0.0	-
Gatsibo	9,521	100	59.4	0.4	0.2	18.0	0.0	5.6	16.4	-
Gitoki	10,846	100	69.9	0.1	2.3	20.3	0.0	5.7	1.8	-
Kabarore	17,334	100	78.8	1.2	2.0	12.7	0.0	5.2	0.1	0.0
Kageyo	6,294	100	78.7	0.2	2.3	13.6	0.0	5.0	0.3	0.0
Kiramuruzi	10,194	100	84.1	0.4	0.3	11.3	1.6	1.7	0.6	-
Kiziguro	9,993	100	87.5	1.5	0.9	9.7	-	0.3	0.1	-
Muhura	8,362	100	66.5	0.3	1.4	30.4	0.0	0.9	0.5	-
Murambi	9,225	100	80.4	0.1	0.3	15.0	0.0	3.8	0.3	-
Ngarama	9,714	100	84.6	1.3	0.6	10.9	-	2.6	0.1	-
Nyagihanga	7,531	100	88.4	0.2	0.0	11.0	-	0.3	0.0	-
Remera	8,077	100	85.0	0.2	0.4	13.5	-	0.7	0.1	-
Rugarama	12,486	100	89.5	0.1	1.1	7.7	-	1.6	0.0	-
Rwimbogo	11,788	100	93.0	0.1	0.7	5.6	0.0	0.3	0.2	0.0

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

By type of habitat and by Area of residence reveal a similar trend observed at the national level even at provincial level is also evident across areas of residence where, the Planned rural settlement and Dispersed/Isolated housing remain the predominant type of habitat both in urban (86.0% and 7.6%) and rural areas (79.9% and 14.5%).

d. Education

In Gatsibo district, 18.3% of the population has never attended school, while 2.5% have attended nursery, and 62.5 % have attended primary school. Other education levels include 0.6% for INGOBOKA/Vocational, 9.4 for lower secondary, 5.2% for upper secondary, 1.5% for university, and a small proportion 0.0% is not stated. The distribution of the highest level of education attended varies among sectors, with differences in the percentage of individuals at each education level. For example, Gasange has a higher percentage (23.3%) of individuals who have never attended school compared to other sectors, while Gatsibo Sector has a higher percentage (7.6%) of individuals attended upper secondary school. Each sector has its own unique distribution of education levels attended by the population.

Table 22: Population of Gatsibo District aged 3 and above by highest level of school attended by sector

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
Rwanda	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Gatsibo district	495,985	100	18.3	2.5	62.5	0.6	9.4	5.2	1.5	0.0
Gasange	18,734	100	23.3	1.3	61.2	0.4	8.2	4.6	1.1	-
Gatsibo	37,064	100	18.1	2.8	57.4	0.7	11.7	7.6	1.7	0.0
Gitoki	39,249	100	18.2	2.3	64.2	0.8	8.9	4.5	1.2	0.0
Kabarore	64,570	100	18.9	3.1	59.8	0.4	9.6	6.0	2.1	0.0
Kageyo	22,562	100	19.8	1.8	65.5	0.9	7.7	3.4	0.9	-
Kiramuruzi	36,198	100	15.2	2.8	60.8	1.0	10.9	6.9	2.5	0.0
Kiziguro	35,792	100	15.5	3.0	61.2	0.8	11.1	6.3	2.0	0.0
Muhura	30,529	100	21.3	2.1	61.6	0.6	8.6	4.4	1.5	0.0
Murambi	34,078	100	15.6	2.1	69.7	0.5	8.3	3.2	0.8	0.0
Ngarama	34,041	100	19.5	2.5	59.6	0.6	8.3	6.6	2.8	0.0
Nyagihanga	25,784	100	18.8	2.7	65.5	0.7	8.2	3.4	0.6	0.0
Remera	28,854	100	20.3	1.9	62.8	0.6	9.0	4.2	1.2	0.0
Rugarama	44,445	100	17.2	2.7	63.4	0.4	9.8	5.3	1.1	0.0
Rwimbogo	44,085	100	17.8	2.0	64.8	0.4	9.5	4.6	1.0	0.0

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

e. Means of livelihoods

The results from the 5th RPHC 2022 revealed that, in Gatsibo district, 78.5% of the private households are engaged in agriculture activities, 72.0% in crop farming and 53.7% engaged in livestock husbandry. Distribution of households engaged in agriculture activities varies substantially across sectors in Gatsibo district. The percentage of private households involved in agriculture activities is high in Muhura (89.4%), Gasange (88.4%) and Murambi (88.0%) while it is low in Gatsibo (67.0%) and Kabarore (69.1%). Crop farming households are more prevalent in Muhura (84.6%), Murambi (83.3%) and Gasange (83.2%). The percentage of households engaged in crop farming is low in Gatsibo (61.0%), Kabarore (62.8%) and

Ngarama (63.0). Sectors with high percentage of households engaged in livestock husbandry are Muhura (70.8%) and Gasange (70.1%), whereas the ones with low percentage are Kabarore (40.4%) and Rwimbogo (45.2%).

It was also revealed that the employment to population ratio is 48.8% among people residing in Gatsibo districts, it is higher in urban areas of Gatsibo (57.5 %) than in rural areas of Gatsibo (47.9%). The employment to population ratio among males as well as females increases from age group 16-19 to 35-44 and starts decreasing from age group 45-49 to 85 years and above as people start getting very older and retire. It was observed that in district of Gatsibo, the highest employment to population ratio among males stands at 70.6% and was observed in age group 30-34. On the other side the highest employment to population among females is 53.4% and was observed in the age group 40-44. The lowest employment to population ratio among males stands at 9.6% and was observed among males in the age group 85+, the lowest employment to population ratio among females is 6.0% and was observed among females in the age group 85+.

Table 23: Distribution of household engaged in livestock husbandry in Gatsibo District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,928	62.6	1,669,273	50.4
Eastern Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Gatsibo district	136,208	106,895	78.5	98,023	72.0	73,199	53.7
Gasange	4,843	4,282	88.4	4,027	83.2	3,395	70.1
Gatsibo	9,521	6,377	67.0	5,808	61.0	4,543	47.7
Gitoki	10,846	8,405	77.5	7,527	69.4	5,644	52.0
Kabarore	17,334	11,968	69.1	10,887	62.8	6,995	40.4
Kageyo	6,294	5,319	84.5	4,706	74.8	4,243	67.4
Kiramuruzi	10,194	7,825	76.8	7,156	70.2	5,220	51.2
Kiziguro	9,993	7,644	76.5	7,033	70.4	4,772	47.8
Muhura	8,362	7,477	89.4	7,073	84.6	5,922	70.8
Murambi	9,225	8,119	88.0	7,689	83.3	5,863	63.6
Ngarama	9,714	6,994	72.0	6,117	63.0	4,539	46.7
Nyagihanga	7,531	6,600	87.6	6,135	81.5	5,207	69.1
Remera	8,077	6,681	82.7	5,891	72.9	5,304	65.7
Rugarama	12,486	9,813	78.6	9,119	73.0	6,223	49.8
Rwimbogo	11,788	9,391	79.7	8,855	75.1	5,329	45.2

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

f. Health, Water supply and Sanitation facilities

In Gatsibo District 94.1% are using Mutuelle as main health insurance, 2.7% using RSSB or RAMA, 0.3% using private insurance, 0.0% using school insurance, 2% using NGOs insurance and 0.9% using employer insurance.

The results of the 5RPHC 2022 reveal that improved drinking water sources is the most water sources in Rwanda that represent (82.3%). In Gatsibo district, 78.4% of private households use improved drinking water sources. At the sector level, the percentage of the private households using water from improved drinking sources is highest in Kabarore (89.5%), and the lowest in Kiramuruzi (51.2%).

In Gatsibo district, the percentage of households using improved drinking water sources is high in Kabarore (89.5%), Gitoki (89.0%), Murambi (88.7%), Muhura (87.5%), and Remera (86.1%). The high percentages of households using unimproved drinking water sources are found in Kiramuruzi (48.8%), Ngarama (31.9%), and Gasange (31.8%).

g. Appliance and assets ownership

At the district level, 76.5% of private households possess a radio, 71.4% mobile phone, 12.9% smartphone, 6.3% TV and 1.3% computer. At sector level, the percentage of private households possessing a radio is high in Kabarore (80.6%), Rwimbogo (80.2%), Kiramuruzi (79.2%) and Gatsibo (79.0%). Radio possession is low in Remera (70.9%), Kageyo (71.0%) and Murambi (71.6%). The percentage of private households possessing a television is high in Kiramuruzi (11.6%), Kiziguro (9.5%) and Kabarore (8.8%) while it is low in Murambi and Nyagihanga (3.3% each) and Gasange (3.5%). Mobile phones are mostly possessed by private households in Kabarore (77.8%), Rwimbogo (77.0%) and Kiramuruzi (75.4%). The percentage of households owning at least one mobile phone is low in Kageyo (62.7%) and Remera (63.2%). Sectors with high percentage of households owning at least one smartphone are Gatsibo (21.2%) and Kiramuruzi (19.3%), whereas the ones with low percentage are Kageyo (6.9%) and Nyagihanga (7.5%). The computer is mostly possessed in Kiramuruzi (2.3%), Ngarama (2.1%) and Kiziguro (1.9%). Computer possession is the lowest in Murambi and Nyagihanga sectors (0.6% each).

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

Sectors and area of residence	Total Number of Private	% 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
Eastern Province	886,132	80.3	9.3	76.5	16.4	2.1
Gatsibo district	136,208	76.5	6.3	71.4	12.9	1.3
Gasange	4,843	75.4	3.5	67.7	8.4	1.0
Gatsibo	9,521	79.0	5.1	74.9	21.2	1.0
Gitoki	10,846	76.2	5.4	70.7	11.3	1.1
Kabarore	17,334	80.6	8.8	77.8	15.9	1.9
Kageyo	6,294	71.0	2.7	62.7	6.9	0.9
Kiramuruzi	10,194	79.2	11.6	75.4	19.3	2.3
Kiziguro	9,993	77.3	9.5	73.4	16.5	1.9
Muhura	8,362	74.3	5.4	65.7	10.6	1.3
Murambi	9,225	71.6	3.3	65.8	8.0	0.6
Ngarama	9,714	74.8	6.6	70.0	13.7	2.1
Nyagihanga	7,531	73.5	3.3	66.2	7.5	0.6
Remera	8,077	70.9	4.8	63.2	8.8	0.7
Rugarama	12,486	77.4	6.8	73.1	13.2	0.9
Rwimbogo	11,788	80.2	5.7	77.0	10.6	0.7

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

h. Access to energy for lighting and cooking

In Gatsibo district, the main source of energy for lighting used by households is electricity (48.8%) followed by Flashlight/ Phone Flashlight (41.8%). At the sector level, the percentage of households using electricity for lighting is high in Kiziguro (59.2%), Kiramuruzi (57.1%), Gatsibo sector (54.8%) and Nyagihanga (53.4%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Murambi (54.1%) and Rwimbogo (47.9%).

According to the area of residence, the main source of energy for lighting is electricity (68.7%), followed by flashlight/phone flashlight (22.8%) and candles (4.4%) in Urban areas. In rural areas, 46.5% of private

households use electricity as main source of energy for lighting while 44.0% use flashlight or phone flashlight and 3.1% use candles.

Table 25: Distribution of households of Gatsibo District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for lighting
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
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	1.8	0.5
Gatsibo District	136,208	100	48.8	0.4	0.0	3.2	1.3	2.6	41.8	0.2	1.2	0.6
Gatsibo -Urban	14,325	100	68.7	0.2	-	4.4	0.7	1.6	22.8	0.1	1.0	0.5
Gatsibo -Rural	121,883	100	46.5	0.4	0.0	3.1	1.3	2.7	44.0	0.2	1.2	0.6
Gasange	4,843	100	46.5	0.1		2.0	0.9	1.1	48.2	0.2	0.5	0.5
Gatsibo	9,521	100	54.8	0.3	0.0	4.3	1.1	0.7	36.6	0.2	1.2	0.9
Gitoki	10,846	100	46.9	0.6	0.0	3.3	1.5	1.4	44.0	0.1	1.1	0.9
Kabarore	17,334	100	46.9	0.4	-	2.7	1.1	3.7	43.0	0.3	1.6	0.4
Kageyo	6,294	100	42.6	0.4	-	3.1	1.9	2.4	47.5	0.1	1.3	0.7
Kiramuruzi	10,194	100	57.1	0.4	0.0	5.2	1.0	3.0	31.2	0.2	1.3	0.5
Kiziguro	9,993	100	59.2	0.2	0.0	3.4	0.9	2.9	31.2	0.1	1.9	0.3
Muhura	8,362	100	47.4	0.2	-	2.6	1.1	2.5	44.8	0.3	0.7	0.4
Murambi	9,225	100	36.7	0.5	-	3.0	1.0	3.2	54.1	0.2	0.9	0.4
Ngarama	9,714	100	52.5	0.1	0.1	3.7	1.7	1.1	38.2	0.2	0.8	1.7
Nyagihanga	7,531	100	53.4	0.4	0.0	3.4	1.7	1.3	38.7	0.1	0.6	0.5
Remera	8,077	100	43.9	0.3	0.1	2.6	1.0	6.2	44.3	0.4	0.6	0.7
Rugarama	12,486	100	50.0	0.3	0.0	3.5	1.4	3.0	39.7	0.3	1.4	0.3
Rwimbogo	11,788	100	43.7	0.8	0.0	1.8	1.7	2.3	47.9	0.2	1.4	0.3

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 (89.7%) followed by charcoal (6.3%). At the sector level, firewood is the most used source of cooking energy by private households in Kageyo (96.8%) and Nyagihanga (96.1%) followed by Remera (94.7%) and Gasange (94.2%). Sectors with the high percentage of private households using charcoal as main source of cooking energy are Gatsibo Sector (20.3%) and Kabarore (9.6%). By area of residence, private households use mostly firewood (65.2%) and charcoal (26.1%) in urban areas. In rural areas, private households use most firewood (92.6%) and charcoal (4.0%).

i. Vulnerability

In Gatsibo district, the vulnerability prevalence rate is 3.4%.

Table 26: Persons with vulnerability of Gatsibo District by Sector of residence and sex

Sectors of residence	Total resident population age 5 years and above	Person's with Vulnerability			Prevalence of Vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Gatsibo district	478,309	16,420	7,614	8,806	3.4
Gasange	18,130	458	222	236	2.5

Sectors of residence	Total resident population age 5 years and above	Person's with Vulnerability			Prevalence of Vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Gatsibo	35,824	1,982	875	1,107	5.5
Gitoki	38,005	1,386	653	733	3.6
Kabarore	61,395	2,032	962	1,070	3.3
Kageyo	21,872	715	347	368	3.3
Kiramuruzi	34,621	1,428	595	833	4.1
Kiziguro	34,294	979	455	524	2.9
Muhura	29,197	620	301	319	2.1
Murambi	33,148	1,126	533	593	3.4
Ngarama	33,080	1,345	603	742	4.1
Nyagihanga	25,083	664	331	333	2.6
Remera	27,930	1,092	486	606	3.9
Rugarama	42,831	1,094	549	545	2.6
Rwimbogo	42,899	1,499	702	797	3.5

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

Regarding the prevalence of disability among the population age 5 years and above by type of disability, 1.4% have a disability of not seeing, 1.1% have a disability of walking. All the remaining type of disabilities (Hearing, communicating, Remembering or concentrating, self-care, short stature and albinism their respective prevalence is under 1%). The table below indicates that in Gatsibo district the prevalence of disability of seeing is at 1.3 %. All the remaining disabilities have prevalence below 1%.

4.4. Kayonza District

4.4.1. Physical environment

a. Location

Kayonza District is one of the seven districts constituting the Eastern Province of the Republic of Rwanda. The district surface is estimated at 1,954 km². The district is one of the seven districts that make up this province. The district is strategically located, bordering several other districts and a neighboring country namely

North: Borders Gatsibo District
 East: Borders the Republic of Tanzania
 South: Borders Kirehe and Ngoma Districts
 West: Borders Rwamagana District

Kayonza is accessible via major roads, with the town of Kayonza serving as a key junction that connects the Eastern Province to Kigali, the capital city of Rwanda, as well as other regions of the country. The district's location makes it an important transit area for trade and travel between Rwanda and Tanzania.

b. Topography

The District of Kayonza is composed by many hills and the slope whose altitude varies from 1400 to 1600 masl. This relief is characterized by trays of lager summit and hills with quite slopes except the East where we can find the steep slopes and stony.

c. Climate and rainfall

The climate of Kayonza district is wet tropical and it is characterized by 4 seasons which are made of alternation of two wet seasons and two dry seasons. These are the short rain season (from October to December). This season corresponds to Agricola season A. There is also a short dry season (from January to February), the long rain season (from March to June) corresponding to the Agricola season B. There is also the long dry season (from July to September) corresponding to Agricola season C. The average annual

temperature ranges between 18 ° C and 26 ° C but might rise slightly above 21°C but not exceeding 25°C, during the dry season, while it might drop to 16°C in the wet season. The average annual rainfall varies between 1000mm and 1200mm. March and April are the wettest months of the district

d. Geology and Soils

Kayonza District is crossed by two agro bioclimatic areas which are Eastern plates and Kibungo East. Eastern plates and Kibungo East are located in altitudes of between 1000 m and 1200 m. The soils are reliable to erosions. The percentage of land that has been reported as protected against soil erosion in Kayonza district is 52%. The frequent plants are beans, sweet potatoes, soya, groundnut, Irish potatoes, cassava, maize, bananas, fruits, vegetables and coffee. The soils order of the district is dominated by the prevalence of five geological orders such as oxisols, alfisols, inceptisols, Mollisols, ultisols and lakes.

e. Hydrography

The hydrographical network of Kayonza District is relatively dense and is primarily made by a multitude of small interior lakes (Ihema, Rwibishuhe, Kabigabiro and Cyabatanzi, Kibare, Shakani, Kivumba and Hago) and the lake Muhazi that Kayonza divides with the close Districts. In addition to these lakes, Kayonza has moreover many swamps. There are only few sources of water in the District of Kayonza primarily made by a multitude of small interior lakes. The District of Kayonza counts 45 marshlands among them 11 marshlands fully used and managed, 31 marshlands to be used under specific conditions and 3 marshlands for use without specific conditions. Those resources host a high potential for increasing agricultural production and diversifying products.

4.4.2. Ecological environment

Kayonza District is ecologically diverse, with savanna grasslands, woodlands, wetlands, and lakes providing habitats for numerous species. The district is characterized by a mix of savanna, wetlands, and human-modified landscapes. The district is home to Akagera National Park, which plays a crucial role in maintaining biodiversity.

a) Flora

Kayonza's vegetation is dominated by savanna grasslands, woodlands, wetlands, and riparian forests. The district has native and introduced plant species, some of which are vital for biodiversity, soil conservation, and economic activities. The most dominant are: (i) Savanna Vegetation including *Acacia polyacantha* (White thorn), *Acacia sieberiana* (Paperbark thorn), *Balanites aegyptiaca* (Desert date), *Combretum molle* (Velvet bushwillow), *Terminalia brownii* (Terminalia tree), *Erythrina abyssinica* (Red-hot poker tree), *Grewia bicolor* (False brandy bush) (ii) Woodlands and forested areas including *Albizia gummifera* (Peacock flower tree), *Markhamia lutea* (Nile tulip tree), *Ficus sycomorus* (Sycamore fig), *Rhus natalensis* (Natal rhus), *Bridelia micrantha* (Mitzeeri); (iii) Wetland and riverine vegetation such as *Cyperus papyrus* (Papyrus), *Typha domingensis* (Cattail), *Phragmites mauritianus* (Reed grass), *Phoenix reclinata* (Wild date palm), *Syzygium cordatum* (Waterberry tree) ;(iv) Introduced and agroforestry species such as *Eucalyptus spp.* (Eucalyptus trees), *Pinus patula* (Patula pine), *Grevillea robusta* (Silk oak), *Persea americana* (Avocado tree), *Mangifera indica* (Mango tree)

b) Fauna

Kayonza District supports a wide variety of wildlife, especially within Akagera National Park.

c) Mammals

These include (i) large mammals such as *Loxodonta africana* (African elephant), *Panthera leo* (African lion), *Panthera pardus* (Leopard), *Diceros bicornis* (Black rhinoceros), *Ceratotherium simum* (White rhinoceros), *Syncerus caffer* (African buffalo), *Hippopotamus amphibius* (Hippopotamus), *Crocuta crocuta* (Spotted hyena); (ii) **Herbivores** such as *Tragelaphus scriptus* (Bushbuck), *Tragelaphus strepsiceros* (Greater kudu), *Kobus ellipsiprymnus* (Waterbuck), *Aepyceros melampus* (Impala), *Phacochoerus africanus* (Warthog),

Giraffa camelopardalis (Masai giraffe), *Equus quagga boehmi* (Plains zebra); (iii) Small Mammals such as *Papio anubis* (Olive baboon), *Chlorocebus pygerythrus* (Vervet monkey), *Galago senegalensis* (Senegal bush baby), *Genetta genetta* (Common genet)

d) Bird species

Kayonza, particularly around Akagera National Park, is a haven for bird species, making it an important destination for birdwatching. Among them include (i) Water birds & wetland species such as *Balearica regulorum* (Grey crowned crane), *Anastomus lamelligerus* (African openbill stork), *Ardea goliath* (Goliath heron), *Egretta garzetta* (Little egret), *Mycteria ibis* (Yellow-billed stork), *Pelecanus rufescens* (Pink-backed pelican); (ii) Savanna and Woodland Birds such as *Bucorvus leadbeateri* (Southern ground hornbill), *Halcyon senegalensis* (Woodland kingfisher), *Corythaixoides concolor* (Grey go-away bird), *Milvus migrans* (Black kite), *Tockus erythrorhynchus* (Red-billed hornbill); (iii) Raptors and Birds of Prey such as *Aquila rapax* (Tawny eagle), *Haliaeetus vocifer* (African fish eagle), *Polemaetus bellicosus* (Martial eagle), *Gyps africanus* (White-backed vulture)

e) Reptiles and amphibians

These include *Crocodylus niloticus* (Nile crocodile), *Varanus niloticus* (Nile monitor lizard), *Python sebae* (African rock python), *Naja nigricollis* (Black-necked spitting cobra), *Bitis arietans* (Puff adder).

f) Fish and aquatic life

Kayonza has several water bodies which support a variety of fish species such as *Oreochromis niloticus* (Nile tilapia), *Clarias gariepinus* (African catfish), *Protopterus aethiopicus* (African lungfish), *Labeo victorianus* (Victoria labeo)

4.4.3. Socio-economic characteristics

a. Population

The results in Table 1 indicates that 551,164 residents were enumerated in Gatsibo district, and the population share is 15.5% of the total population of the Eastern Province. The population of Gatsibo district is predominantly female: 286,703 are women corresponding to 52.0 % of its total population. Females are predominant all sectors the district. The most populated sector is Kabarore with 13.0% of the total population of the district. The two less populated sectors are Gasange and Kageyo (20,725 residents and 24,702 residents respectively). They represent 3.8% and 4.5% of the total resident population of Gatsibo district, respectively.

Table 27: Population of Gatsibo 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	
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	
Gatsibo district	551,164	264,461	286,703	100	48	52	100
Gasange	20,725	10,054	10,671	100	48.5	51.5	3.8
Gatsibo	40,940	19,618	21,322	100	47.9	52.1	7.4
Gitoki	43,414	20,690	22,724	100	47.7	52.3	7.9
Kabarore	71,769	34,598	37,171	100	48.2	51.8	13
Kageyo	24,702	11,849	12,853	100	48	52	4.5
Kiramuruzi	40,028	19,099	20,929	100	47.7	52.3	7.3
Kiziguro	39,757	18,924	20,833	100	47.6	52.4	7.2
Muhura	33,325	16,046	17,279	100	48.2	51.8	6
Murambi	38,498	18,436	20,062	100	47.9	52.1	7
Ngarama	38,006	18,353	19,653	100	48.3	51.7	6.9

District Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Nyagihanga	28,812	13,858	14,954	100	48.1	51.9	5.2
Remera	31,771	15,122	16,649	100	47.6	52.4	5.8
Rugarama	49,442	23,625	25,817	100	47.8	52.2	9
Rwimbogo	49,975	24,189	25,786	100	48.4	51.6	9.1

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

The results from the 5th Rwanda Population and housing census reveal that, the population of Rwanda are predominantly distributed in rural areas that represent 72.1% of resident population compared to 27.9% in urban areas. The population in Eastern Province is predominantly rural (79.1%) comparatively to urban areas (20.9%). The same trend is observed at district level (Gatsibo) where, the population in that district mostly found to live in rural areas (90%) compared to urban areas (10%). Results presented in Table 1. 3 Distribution (Count and %) of Resident Population of Gatsibo district by sector and Area of Residence in 2022 show that, sectors namely: Gasange, Kageyo, Muhura, Murambi, Nyagihanga and Remera are entirely rural sectors of Gatsibo district.

b. Number of households and size of household

The results of 5thRPHC 2022 indicate the total of 114,186 in Kayonza district. The average household size in Kayonza district is 4.00 persons per household. At the Sector level, the highest sizes are found in Mwiri (4.30 persons/household), Gahini (4.12 persons/household), Murundi (4.10 persons/household) and Ndego (4.07 persons/household). The smallest household sizes are found in Mukarange (3.73 persons/household each) and in Ruramira (3.85 persons/household). The results of 5thRPHC 2022 revealed that nationally 28.9% of private households are headed by women. In Kayonza district, private households headed by females are 30.1%. At sector level, the highest percentages of households headed by women are found in Ruramira sector (33.8%) and Nyamirama sector (33.0%) while the lowest is found in Murundi sector (27.0%).

Table 28: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ⁸	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
Eastern Province	886,132	5,521,227	4.0	70.4	29.6
Kayonza District	114,186	456,230	4.0	69.9	30.1
Gahini	11,150	45,951	4.1	71.3	28.7
Kabare	10,087	40,209	4.0	69.1	30.9
Kabarondo	9,758	37,749	3.9	68.9	31.1
Mukarange	14,669	54,660	3.7	70.3	29.7
Murama	5,908	23,349	4.0	68.1	31.9
Murundi	14,070	57,705	4.1	73.0	27.0
Mwiri	8,810	37,893	4.3	72.6	27.4
Ndego	5,964	24,248	4.1	71.3	28.7
Nyamirama	9,694	38,540	4.0	67.0	33.0
Rukara	9,334	38,029	4.1	67.2	32.8
Ruramira	5,495	21,166	3.9	66.2	33.8
Rwinkwavu	9,247	36,731	4.0	70.5	29.5

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

c. Housing characteristics

Results from the 5th Rwanda Population and Housing Census 2022 revealed that, in Eastern Province the predominant type of habitat is Planned rural settlement also known as umudugudu settlement (86.5%) and Dispersed/Isolated housing (7.4%). The same trend is observed at district level, where the most common type of habitat in Gatsibo district is umudugudu settlements (80.5%) and Dispersed/Isolated housing (13.8%). Results presented in Table 4 show that the type of habitat varies across all sectors in Gatsibo district. Umudugudu settlement is the most prevalent type of habitat in Rwimbogo (93.0%) Rugarama (89.5%), and Nyagihanga (88.4%) Kiziguro sector (87.5%). Sectors with the highest percentages of dispersed or isolated housing units are: Muhura (30.4%) followed by Gasange (23.3%) and Gitoki (20.3%).

Table 29: Distribution of households in Gatsibo District by type of habitat

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
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Gatsibo district	136,208	100	80.5	0.5	1.0	13.8	0.1	2.6	1.5	0.0
Gatsibo Urban	14,325	100	86.0	0.8	0.6	7.6	1.2	3.1	0.6	0.0
Gatsibo Rural	121,883	100	79.9	0.5	1.0	14.5	0.0	2.6	1.6	0.0
Gasange	4,843	100	75.8	0.1	0.2	23.3	-	0.6	0.0	-
Gatsibo	9,521	100	59.4	0.4	0.2	18.0	0.0	5.6	16.4	-
Gitoki	10,846	100	69.9	0.1	2.3	20.3	0.0	5.7	1.8	-
Kabarore	17,334	100	78.8	1.2	2.0	12.7	0.0	5.2	0.1	0.0
Kageyo	6,294	100	78.7	0.2	2.3	13.6	0.0	5.0	0.3	0.0
Kiramuruzi	10,194	100	84.1	0.4	0.3	11.3	1.6	1.7	0.6	-
Kiziguro	9,993	100	87.5	1.5	0.9	9.7	-	0.3	0.1	-
Muhura	8,362	100	66.5	0.3	1.4	30.4	0.0	0.9	0.5	-
Murambi	9,225	100	80.4	0.1	0.3	15.0	0.0	3.8	0.3	-
Ngarama	9,714	100	84.6	1.3	0.6	10.9	-	2.6	0.1	-
Nyagihanga	7,531	100	88.4	0.2	0.0	11.0	-	0.3	0.0	-
Remera	8,077	100	85.0	0.2	0.4	13.5	-	0.7	0.1	-
Rugarama	12,486	100	89.5	0.1	1.1	7.7	-	1.6	0.0	-
Rwimbogo	11,788	100	93.0	0.1	0.7	5.6	0.0	0.3	0.2	0.0

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

By type of habitat and by Area of residence reveal a similar trend observed at the national level even at provincial level is also evident across areas of residence where, the Planned rural settlement and Dispersed/Isolated housing remain the predominant type of habitat both in urban (86.0% and 7.6%) and rural areas (79.9% and 14.5%).

d. Appliance and assets ownership

At the district level, 76.5% of private households possess a radio, 71.4% mobile phone, 12.9% smartphone, 6.3% TV and 1.3% computer. At sector level, the percentage of private households possessing a radio is high in Kabarore (80.6%), Rwimbogo (80.2%), Kiramuruzi (79.2%) and Gatsibo (79.0%). Radio possession is low in Remera (70.9%), Kageyo (71.0%) and Murambi (71.6%). The percentage of private households possessing a television is high in Kiramuruzi (11.6%), Kiziguro (9.5%) and Kabarore (8.8%) while it is low in

Murambi and Nyagihanga (3.3% each) and Gasange (3.5%). Mobile phones are mostly possessed by private households in Kabarore (77.8%), Rwimbogo (77.0%) and Kiramuruzi (75.4%). The percentage of households owning at least one mobile phone is low in Kageyo (62.7%) and Remera (63.2%). Sectors with high percentage of households owning at least one smartphone are Gatsibo (21.2%) and Kiramuruzi (19.3%), whereas the ones with low percentage are Kageyo (6.9%) and Nyagihanga (7.5%). The computer is mostly possessed in Kiramuruzi (2.3%), Ngarama (2.1%) and Kiziguro (1.9%). Computer possession is the lowest in Murambi and Nyagihanga sectors (0.6% each).

Table 30: Percentage of private households and of Gatsibo District possessing electrical appliance

Sectors and area of residence	Total Number of Private	% 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
Eastern Province	886,132	80.3	9.3	76.5	16.4	2.1
Gatsibo district	136,208	76.5	6.3	71.4	12.9	1.3
Gasange	4,843	75.4	3.5	67.7	8.4	1.0
Gatsibo	9,521	79.0	5.1	74.9	21.2	1.0
Gitoki	10,846	76.2	5.4	70.7	11.3	1.1
Kabarore	17,334	80.6	8.8	77.8	15.9	1.9
Kageyo	6,294	71.0	2.7	62.7	6.9	0.9
Kiramuruzi	10,194	79.2	11.6	75.4	19.3	2.3
Kiziguro	9,993	77.3	9.5	73.4	16.5	1.9
Muhura	8,362	74.3	5.4	65.7	10.6	1.3
Murambi	9,225	71.6	3.3	65.8	8.0	0.6
Ngarama	9,714	74.8	6.6	70.0	13.7	2.1
Nyagihanga	7,531	73.5	3.3	66.2	7.5	0.6
Remera	8,077	70.9	4.8	63.2	8.8	0.7
Rugarama	12,486	77.4	6.8	73.1	13.2	0.9
Rwimbogo	11,788	80.2	5.7	77.0	10.6	0.7

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

In Kayonza District, 18.2% of the population has never attended school, while 3.1% have attended nursery, and 61.5% have attended primary school. Other education levels include 0.5% for INGOBOKA/Vocational, 9.1% for lower secondary, 5.6% for upper secondary, 2.0% for university, and 0.0% is not stated. The distribution of the highest level of education attended varies among sectors, with differences in the percentage of individuals at each education level. For example, Ruramira has a higher percentage (23.1%) of individuals who have never attended school compared to other sectors, while Mukarange has a higher percentage (11.4%) of individuals who attended upper secondary school. The percentage of those attended primary school is more than 50% where Murama (66.4%) is the sector with the highest percentage. Kabarondo has a high percentage of those attended university level (3.3%). Each sector has its own unique distribution of education levels attended by the population.

Table 31: Population of Kayonza District aged 3+ by highest level of school attended by sector

Sectors	Count	Percentage								
		Highest level of education attended								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
RWANDA	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Kayonza District	412,951	100	18.2	3.1	61.5	0.5	9.1	5.6	2.0	0.0

Sectors	Count	Percentage								
		Highest level of education attended								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
Gahini	41,272	100	19.2	2.6	62.4	0.6	8.0	4.8	2.4	0.0
Kabare	36,324	100	19.5	2.2	64.2	0.4	8.6	4.2	0.9	0.0
Kabarondo	34,596	100	15.2	3.7	58.8	0.5	10.1	8.4	3.3	0.0
Mukarange	49,628	100	13.6	4.5	53.2	0.6	11.7	11.4	5.0	0.0
Murama	21,192	100	15.4	3.7	66.4	0.4	8.8	4.3	0.8	0.0
Murundi	51,863	100	22.4	3.1	61.4	0.4	7.7	4.0	1.0	0.0
Mwiri	34,292	100	20.6	2.7	61.2	0.6	8.6	5.0	1.2	0.0
Ndego	21,584	100	20.7	2.2	63.7	0.4	8.3	3.6	1.1	0.0
Nyamirama	35,221	100	18.0	3.3	61.9	0.4	8.9	5.5	1.9	0.0
Rukara	34,284	100	14.6	3.0	64.7	0.9	10.2	4.6	2.1	0.0
Ruramira	19,266	100	23.1	2.7	63.4	0.3	7.1	2.8	0.7	0.0
Rwinkwavu	33,429	100	18.0	2.6	63.6	0.7	9.1	4.6	1.3	0.0

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

e. Means of livelihoods

The results of 5th RPHC 2022 revealed that Nationally, 2,280,854 of private households (68.9%) are engaged in agriculture, among them 62.6% are engaged in crop farming and 50.4% are engaged in Livestock husbandry.

In Kayonza district, Agricultural households represent 74.5% with 68.4% of households engaged in crop farming and 45.7% Households engaged in Livestock husbandry. At the sector level, the highest percentages of agricultural households are found in Murama (87.4%), Kabare (87.2%) and Ruramira (83.6%) where crop farming are more represented with percentage of 83.1%, 81.6% and 78.5% and those engaged in livestock husbandry with percentage of 58.6%, 61.7% and 56.3% respectively.

It was also revealed that the employment to population ratio is 45.3percent among people residing in Kayonza districts, it is higher in urban areas of Kayonza (52.0 percent) than in rural areas of Kayonza (44.1 percent). The employment to population ratio among males as well as females increases from age group 16-19 to 35-44 and starts decreasing from age group 45-49 to 85 years and above as people starts getting very older and retire.

It was observed that in district of Kayonza. the highest employment to population ratio among males stands at 65.6% and was observed in age group 30-34. On the other side the highest employment to population among females is 52.0% and was observed in the age group 40-44. The lowest employment to population ratio among males stands at 10.2% and was observed among males in the age group 80-84. the lowest employment to population ratio among females is 3.1% and was observed among females in the age group 85+.

Table 32: Distribution of household engaged in livestock husbandry in Kayonza District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,928	62.6	1,669,273	50.4

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Eastern Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Kayonza District	114,186	85,078	74.5	78,066	68.4	52,129	45.7
Gahini	11,150	7,996	71.7	7,180	64.4	4,695	42.1
Kabare	10,087	8,797	87.2	8,228	81.6	6,219	61.7
Kabarondo	9,758	6,726	68.9	6,112	62.6	4,330	44.4
Mukarange	14,669	7,460	50.9	6,531	44.5	4,408	30.0
Murama	5,908	5,166	87.4	4,912	83.1	3,465	58.6
Murundi	14,070	10,547	75.0	9,757	69.3	5,423	38.5
Mwiri	8,810	7,017	79.6	6,492	73.7	3,930	44.6
Ndego	5,964	4,781	80.2	4,444	74.5	2,811	47.1
Nyamirama	9,694	7,496	77.3	6,859	70.8	4,822	49.7
Rukara	9,334	7,286	78.1	6,677	71.5	4,560	48.9
Ruramira	5,495	4,594	83.6	4,316	78.5	3,091	56.3
Rwinkwavu	9,247	7,212	78.0	6,558	70.9	4,375	47.3

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

f. Health, Water supply and Sanitation facilities

In Kayonza District 95.5% are using Mutuelle as main health insurance, 2.8% using RSSB or RAMA, 0.3% using private insurance, 0.0% using school insurance, 0.0% using NGOs insurance and 1.3% using employer insurance.

The results of 5RPHC 2022 reveal that improved water sources are the most water sources in Rwanda that represent (82.3%). In Kayonza district, 84.4% of private households use improved water sources. At the sector level, the percentages of the private households using water from improved sources are high in Rwinkwavu (95.3%) and Rwinkwavu (95.0%) while the lowest is in Ndego (40.3%).

In Kayonza district, both urban and rural areas of Kayonza District, private households use mainly improved drinking water source (95.3% in urban and 82.5% in rural). The percentage of private households using unimproved source of water is higher in rural (17.5%) than in urban (4.7%).

g. Access to energy for lighting and cooking

In Gatsibo district, the main source of energy for lighting used by households is electricity (48.8%) followed by Flashlight/ Phone Flashlight (41.8%). At the sector level, the percentage of households using electricity for lighting is high in Kiziguro (59.2%), Kiramuruzi (57.1%), Gatsibo sector (54.8%) and Nyagihanga (53.4%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Murambi (54.1%) and Rwimbogo (47.9%).

According to the area of residence, the main source of energy for lighting is electricity (68.7%), followed by flashlight/phone flashlight (22.8%) and candles (4.4%) in Urban areas. In rural areas, 46.5% of private households use electricity as main source of energy for lighting while 44.0% use flashlight or phone flashlight and 3.1% use candles.

Table 33: Distribution of households of Gatsibo District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable	Lantern	Other source of energy	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
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	1.8	0.5	0.0
Gatsibo District	136,208	100	48.8	0.4	0.0	3.2	1.3	2.6	41.8	0.2	1.2	0.6	0.0
Gatsibo -Urban	14,325	100	68.7	0.2	-	4.4	0.7	1.6	22.8	0.1	1.0	0.5	0.0
Gatsibo -Rural	121,883	100	46.5	0.4	0.0	3.1	1.3	2.7	44.0	0.2	1.2	0.6	0.0
Gasange	4,843	100	46.5	0.1		2.0	0.9	1.1	48.2	0.2	0.5	0.5	-
Gatsibo	9,521	100	54.8	0.3	0.0	4.3	1.1	0.7	36.6	0.2	1.2	0.9	-
Gitoki	10,846	100	46.9	0.6	0.0	3.3	1.5	1.4	44.0	0.1	1.1	0.9	-
Kabarore	17,334	100	46.9	0.4	-	2.7	1.1	3.7	43.0	0.3	1.6	0.4	0.0
Kageyo	6,294	100	42.6	0.4	-	3.1	1.9	2.4	47.5	0.1	1.3	0.7	0.0
Kiramuruzi	10,194	100	57.1	0.4	0.0	5.2	1.0	3.0	31.2	0.2	1.3	0.5	-
Kiziguro	9,993	100	59.2	0.2	0.0	3.4	0.9	2.9	31.2	0.1	1.9	0.3	-
Muhura	8,362	100	47.4	0.2	-	2.6	1.1	2.5	44.8	0.3	0.7	0.4	-
Murambi	9,225	100	36.7	0.5	-	3.0	1.0	3.2	54.1	0.2	0.9	0.4	-
Ngarama	9,714	100	52.5	0.1	0.1	3.7	1.7	1.1	38.2	0.2	0.8	1.7	-
Nyagihanga	7,531	100	53.4	0.4	0.0	3.4	1.7	1.3	38.7	0.1	0.6	0.5	-
Remera	8,077	100	43.9	0.3	0.1	2.6	1.0	6.2	44.3	0.4	0.6	0.7	-
Rugarama	12,486	100	50.0	0.3	0.0	3.5	1.4	3.0	39.7	0.3	1.4	0.3	-
Rwimbogo	11,788	100	43.7	0.8	0.0	1.8	1.7	2.3	47.9	0.2	1.4	0.3	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 are firewood (89.7%) followed by charcoal (6.3%). At the sector level, firewood is the most used source of cooking energy by private households in Kageyo (96.8%) and Nyagihanga (96.1%) followed by Remera (94.7%) and Gasange (94.2%). Sectors with the high percentage of private households using charcoal as main source of cooking energy are Gatsibo Sector (20.3%) and Kabarore (9.6%). By area of residence, private households use mostly firewood (65.2%) and charcoal (26.1%) in urban areas. In rural areas, private households use most firewood (92.6%) and charcoal (4.0%).

h. Vulnerability

In Kayonza district the vulnerability prevalence rate is 3.8%. At sector level, the highest prevalence rates of the resident population with vulnerability are in Ruramira and Murundi (4,9%,4,7%) respectively and while the lowest is in Mukarange (2.5%).

Table 34: Persons with vulnerability of Kayonza District above by Sector of residence and sex

Sectors of residence	Total resident population age 5 years and above	Person's with vulnerability			Prevalence of vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Kayonza District	395,680	14,937	6,940	7,997	3.8
Gahini	39,730	1,685	796	889	4.2
Kabare	35,185	1,406	631	775	4
Kabarondo	32,953	1,246	537	709	3.8
Mukarange	47,060	1,183	549	634	2.5
Murama	20,317	913	435	478	4.5
Murundi	49,518	2,314	1,088	1,226	4.7
Mwiri	32,845	1,114	554	560	3.4
Ndego	20,991	723	335	388	3.4
Nyamirama	33,536	1,108	506	602	3.3
Rukara	33,290	1,271	599	672	3.8
Ruramira	18,361	900	394	506	4.9
Rwinkwavu	31,894	1,074	516	558	3.4

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

In Kayonza district, seeing disability (1.48%) is followed by walking disability (1.11%), remembering or concentrating (0.73%)and hearing disability (0.70%).

4.5. Ngoma District

4.5.1. Physical environment

a. Location

Ngoma District is one of seven Districts that constitute the Eastern Province. It is subdivided into fourteen (14) sectors, sixty-four (64) cells and four hundred and seventy-three (473) villages (Imidugudu). The district covers an area of eight hundred sixty-seven-point seventy-four square kilometers (867.74 Km²). It borders Rwamagana District to the North-West, Kayonza District to the North-East, Bugesera District of to the West, Kirehe District to the East and the Republic of Burundi to the South

b. Topography

Ngoma district is generally characterized by low-lying terrain and is a region essentially dominated by hills with low-lying slopes, and an average altitude between 1400m and 1700 m above the sea level. The Relief of Ngoma District is a plateau strongly dissected by tectonic movements of the quaternary period that progressively created valleys, lakes and swamps.

c. Climate and Rainfall

The climate of Ngoma District is temperate type especially in low altitudes. The annual average temperature is around 20C. Ngoma like other regions of the country enjoys four seasons of which two are rainy and other two are dry: a short rainy season which extends from October to December, a short dry season which runs from January to February, a long rainy season from mid-February to mid-May and a long dry season from mid-May to September. Generally, the District has a long dry season and the resulting rain deficiency impacts adversely agricultural and pastoral production.

The annual precipitation of the district lies between 900 and 1400 mm of rains. As regards the soils and hydrography, Ngoma soil is favorable for agricultural activities due to the presence of sandy–clay soils. The district has three lakes namely Bilira, Mugesera and Sake which provide the district with beautiful landscape that can attract tourists if developed and well marketed.

d. Geology and Soils

Ngoma district has a geology that is primarily composed of Precambrian metamorphic rocks. These rocks include schists, quartzites, and granites, which are remnants of ancient geological formations. The district also features some sedimentary rocks such as sandstones and limestones, particularly in the lowland areas. The geological history of the district includes periods of significant tectonic activity, which have contributed to the region's diverse geological structures. Additionally, there are volcanic deposits, though less prominent than in the Northern Province, which have contributed to the soil composition in the district. The main soil types found in the district include: Ferralsols, Acrisols, Vertisols, and Regosols

The combination of these soil types, along with the district's climatic conditions, makes Ngoma a region with diverse agricultural potential. However, soil management practices such as crop rotation, use of organic and inorganic fertilizers, and soil conservation techniques are essential to maintain and improve soil fertility and productivity.

e. Hydrography

The district features a diverse and significant hydrographic network that plays a crucial role in the district's water supply, agriculture, and ecology. The district is characterized by several rivers, lakes, and wetlands that contribute to its hydrological landscape. These include the Akagera river, lake Mugesera, lake Sake and the Mwesa River.

4.5.2. Ecological characteristics

Ngoma District hosts a diverse range of flora and fauna, including savanna woodlands, wetland ecosystems, and agricultural landscapes. It supports various tree species grasses wetland plants (and key wildlife species The district's ecosystems play a vital role in maintaining biodiversity and providing essential services for both humans and wildlife.

a. Flora

The vegetation of Ngoma District is predominantly a mix of savanna woodland, dry forests, grasslands, and wetland vegetation. Agricultural activities have also influenced plant distribution. The Natural Vegetation is made of :

- **Savanna woodlands** – Found in drier areas, with species adapted to semi-arid conditions.
- **Riverine vegetation** – Located along rivers, with dense tree cover providing habitat for wildlife.
- **Wetlands and swamps** – Supporting aquatic and semi-aquatic plant species.
- **Agricultural landscapes** – Featuring both subsistence and commercial crops.

Common plant species of the district include

- **Trees and shrubs** such as *Acacia senegal* (Gum Arabic tree) – Common in savanna areas, *Albizia gummifera* (Peacock flower) – Found in riverine and forested areas., *icus sycomorus* (Sycamore fig) – Grows near water sources, *Brachystegia spiciformis* (Msasa tree) – Dominates some woodlands, *Combretum molle* (Velvet bushwillow) – Found in open savanna landscapes, *Terminalia brownii* – Provides shade and timber in the area, *Diospyros mespiliformis* (Jackalberry tree) – Found in riverine habitats.
- **Grasses and ground cover** such as *Hyparrhenia rufa* (Jaragua grass) – Common in grasslands, *Cymbopogon citratus* (Lemongrass) – Grows in disturbed areas and wetlands, *Panicum maximum* (Guinea grass) – Important for grazing livestock.
- **Wetland and aquatic plants** such as *Cyperus papyrus* (Papyrus) – Found in marshlands and wetlands, *Typha domingensis* (Southern cattail) – Dominates some wetland areas, *Phragmites australis* (Common reed) – Helps in water purification in wetlands.

- **Crops and plantation vegetation** including (i) **Food Crops:** *Zea mays* (Maize), *Sorghum bicolor* (Sorghum), *Oryza sativa* (Rice), *Manihot esculenta* (Cassava), (ii) **Cash Crops:** *Coffea arabica* (Arabica coffee), *Phaseolus vulgaris* (Beans), *Arachis hypogaea* (Groundnuts), (iii) **Fruit Trees:** *Mangifera indica* (Mango), *Carica papaya* (Papaya), *Persea americana* (Avocado).

b. Fauna

The fauna of Ngoma District includes mammals, birds, reptiles, amphibians, and insects. The proximity to Akagera National Park influences the diversity of wildlife, though human activities such as agriculture have impacted certain species.

- Mammals

Some of the large mammals from nearby ecosystems may occasionally be found in parts of Ngoma District. These include *Tragelaphus scriptus* (Bushbuck) – Found in forested and grassland habitats, *Papio anubis* (Olive baboon) – Occurs near woodlands and farmlands, *Cercopithecus mitis* (Blue monkey) – Inhabits patches of forested areas, *Atilax paludinosus* (Marsh mongoose) – Found in wetland regions, *Sylvicapra grimmia* (Common duiker) – Small antelope found in grasslands, *Canis mesomelas* (Black-backed jackal) – Found in savanna landscapes.

- Bird Species

Ngoma District is home to a variety of bird species, especially wetland and savanna birds such as *Anastomus lamelligerus* (African Openbill Stork) – Common in wetland areas, *Balearica regulorum* (Grey Crowned Crane) – Rwanda's national bird, found in marshlands, *Bostrychia hagedash* (Hadada Ibis) – Seen near wetlands and agricultural fields, *Halcyon senegalensis* (Woodland Kingfisher) – Common in savanna regions, *Terathopius ecaudatus* (Bateleur Eagle) – Found in open woodlands, *Milvus migrans* (Black Kite) – Frequently seen soaring above open fields, *Merops bullockoides* (White-fronted Bee-eater) – Occurs in woodland habitats.

- Reptiles and amphibians

Ngoma District hosts several reptiles and amphibians adapted to its climate.

- **Reptiles** such as *Varanus niloticus* (Nile Monitor) – Found near water bodies, *Python sebae* (African Rock Python) – Occurs in grasslands and wetlands, *Naja nigricollis* (Black-necked Spitting Cobra) – Found in savanna and farmlands, *Bitis arietans* (Puff Adder) – A common venomous snake in the region.
- **Amphibians** such as *Xenopus laevis* (African Clawed Frog) – Inhabits ponds and slow-moving waters, *Leptopelis flavomaculatus* (Yellow-spotted Tree Frog) – Found in moist habitats, *Amietophrynus regularis* (African Common Toad) – Common in wetlands and agricultural lands.

- Insects and other invertebrates

Ngoma District is home to various pollinators and decomposers essential for its ecosystems. These include *Apis mellifera* (African Honeybee) – Important for pollination, *Anopheles gambiae* (Malaria Mosquito) – Found in wetland areas, *Goliathus goliatus* (Goliath Beetle) – One of the largest beetles in the region, *Danaus chrysippus* (African Monarch Butterfly) – Common in open grasslands.

4.5.3. Socio-economic characteristics

a. Population

The 5th Rwanda Population and Housing Census (PHC5) has enumerated 404,048 residents in Ngoma District, which represent 11.34% of the total population of the Eastern Province (3,563,145 residents). Ngoma District has a population proportion of 47.7% males and 52.3% females. This indicates a slightly higher proportion of females in the district compared to males. The data shows a consistent female predominance across the district. Rukumberi and Rurenge are the most populated sectors with more than 32 thousand residents each. Collectively, they account for a substantial portion of the total district population, with Rukumberi representing 9.8% and Rurenge representing 8.3% at the district level. Sector represents with a smaller percentage of the total district population, are Karembu accounting for 4.4% and Gashanda (4.8%).

Table 35: Population of Ngoma 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	-
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	-
Ngoma District	404,048	192,720	211,328	100	47.7	52.3	100
Gashanda	19,345	9,214	10,131	100	47.6	52.4	4.8
Jarama	31,122	14,942	16,180	100	48	52	7.7
Karembo	17,726	8,445	9,281	100	47.6	52.4	4.4
Kazo	32,450	15,597	16,853	100	48.1	51.9	8
Kibungo	31,445	14,976	16,469	100	47.6	52.4	7.8
Mugesera	28,637	13,624	15,013	100	47.6	52.4	7.1
Murama	26,702	12,686	14,016	100	47.5	52.5	6.6
Mutenderi	24,915	11,870	13,045	100	47.6	52.4	6.2
Remera	32,344	15,422	16,922	100	47.7	52.3	8
Rukira	29,893	14,301	15,592	100	47.8	52.2	7.4
Rukumberi	39,420	18,739	20,681	100	47.5	52.5	9.8
Rurenge	33,391	15,842	17,549	100	47.4	52.6	8.3
Sake	28,822	13,762	15,060	100	47.7	52.3	7.1
Zaza	27,836	13,300	14,536	100	47.8	52.2	6.9

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

The results of Rwanda Population and Housing Census 2022 revealed that, the majority of the population in Ngoma District (90.8%) resides in rural areas, while the urban population accounts for 9.2% of the total. Looking at the sector-level data, it is observed that there is variation in the distribution of the population across sectors. Sectors such as Gashanda, Jarama, Karembo, Mugesera, Mutenderi, Rukumberi, Rurenge, and Zaza have a 100% rural population, meaning that all residents in these sectors live in rural areas. On the other hand, sectors like Kibungo, Remera, and Sake have a significant urban population, with percentages ranging from 17% to 54.3%.

b. Number of households and size of household

The results of 5thRPHC 2022 indicate the total households of 102,589 in Ngoma District. The average household size in Ngoma District is 3.9 persons per household. At sector level, Rukumberi has the highest population with 39,372 individuals, followed by Kazo with 32,422 individuals living in private households. Karembo has the lowest population with 17,715 individuals living in private households. Looking at the average size of households, most sectors have an average household size of 4.0. However, Gashanda, Kibungo, Mugesera, Murama, and Zaza sectors have a slightly lower average household size of 3.8 and 3.9, indicating smaller households or potentially higher rates of smaller families. The table below indicates number of households and size of household members per sector.

The results of 5thRPHC 2022 revealed that in Ngoma District, 31.4% of households are headed by females and 68.6% are headed by males. With 34.1% of private households headed by females, Zaza sector demonstrates a relatively higher representation of female household heads compared to the other sectors in Ngoma District. On the other hand, Mutenderi sector has the lowest percentage of female-headed households, with 29.0% of households headed by females.

Table 36: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ¹	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
Eastern Province	886,132	3,521,227	4.0	70.4	29.6
Ngoma	102,589	401,257	3.9	68.6	31.4
Gashanda	5,060	19,323	3.8	68.8	31.2
Jarama	7,753	31,108	4.0	69.8	30.2
Karembo	4,481	17,715	4.0	67.0	33.0
Kazo	8,271	32,422	3.9	70.3	29.7
Kibungo	7,750	29,294	3.8	70.8	29.2
Mugesera	7,456	28,599	3.8	69.0	31.0
Murama	6,964	26,673	3.8	68.3	31.7
Mutenderi	6,437	24,869	3.9	71.0	29.0
Remera	8,265	32,280	3.9	67.8	32.2
Rukira	7,489	29,846	4.0	67.7	32.3
Rukumberi	9,990	39,372	3.9	67.3	32.7
Rurenge	8,472	33,352	3.9	68.0	32.0
Sake	7,180	28,765	4.0	68.1	31.9
Zaza	7,021	27,639	3.9	65.9	34.1

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

c. Housing characteristics

The results of 5th Population and Housing Census 2022 revealed that the most common type of habitat in Ngoma District is planned rural settlement housing (96.3%) followed by dispersed or isolated housing (2.1%) and Spontaneous/squatter housing (0.7%). The type of habitat varies across sectors. Planned rural settlement housing is most prevalent in Gashanda (99.6%) and Karembo (99.4%) and low in Zaza (92.4%) and Kazo (90.3%). The sectors with the high percentages of dispersed/isolated housing units are Kazo (7.0%) and Zaza (4.5%). The table below displays results by sector. Additionally, the "Modern planned urban housing" category also has a lower proportion in most sectors, ranging from 0.0% to 0.9%. This indicates that the presence of modern planned urban housing is relatively limited compared to other types of housing in these areas.

Table 37: Distribution of households in Ngoma District by type of habitat

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
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Ngoma District	102,589	100	96.3	0.5	0.2	2.1	0.1	0.7	0.1	-
Ngoma urban	9,196	100	95.0	1.1	1.3	1.1	0.1	1.0	0.3	-
Ngoma rural	93,393	100	96.4	0.5	0.1	2.2	0.1	0.6	0.1	-
Gashanda	5,060	100	99.6	0.2	0.0	0.1	-	-	0.1	-

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu(Planned rural)	Integrated model village	Old settlement	Dispersed/Isolated housing	Modern planned	Spontaneous/squatter housing	Other type of housing	Not stated
Jarama	7,753	100	96.6	0.2	0.3	2.8	0.0	0.1	0.1	-
Karembo	4,481	100	99.4	0.0	0.1	0.2	-	0.3	0.0	-
Kazo	8,271	100	90.3	0.6	0.1	7.0	0.9	1.1	0.1	-
Kibungo	7,750	100	95.6	2.0	1.3	0.6	0.1	0.2	0.3	-
Mugesera	7,456	100	96.6	0.1	0.0	3.1	-	0.1	0.0	-
Murama	6,964	100	98.9	0.0	0.1	0.9	0.0	0.0	0.1	-
Mutenderi	6,437	100	96.1	0.7	0.1	2.3	0.0	0.8	0.0	-
Remera	8,265	100	97.1	1.1	0.1	0.8	0.0	0.7	0.1	-
Rukira	7,489	100	97.3	0.1	0.3	0.6	-	1.7	0.1	-
Rukumberi	9,990	100	96.3	1.1	0.2	1.6	-	0.4	0.4	-
Rurenge	8,472	100	97.9	0.2	0.1	1.6	0.0	0.1	0.1	-
Sake	7,180	100	96.5	0.2	0.1	2.4	0.0	0.8	0.1	-
Zaza	7,021	100	92.4	0.2	0.0	4.5	-	2.9	0.0	-

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

By area of residence, among households residing in urban areas of Ngoma District, the majority (95.0%) live in "Umudugudu" planned rural settlements. Additionally, a small percentage of urban households live in integrated model villages (1.1%), old settlements (1.3%), dispersed/isolated housing (1.1%), modern planned urban housing (0.1%), spontaneous/squatter housing (1.0%), and other types of housing (0.3%). In rural areas of Ngoma District, a higher percentage of households (96.4%) reside in "Umudugudu" planned rural settlements compared to urban areas. A small percentage of rural households live in integrated model villages (0.5%), old settlements (0.1%), dispersed/isolated housing (2.2%), modern planned urban housing (0.1%), spontaneous/squatter housing (0.6%), and other types of housing (0.1%).

d. Education

In Ngoma District, 17.7% of the population has never attended school, while 2.4% have attended nursery, and 65.3% have attended primary school. Other education levels include 0.6% for INGOBOKA/Vocational, 8.0% for lower secondary, 4.4% for upper secondary, 1.6% for university, and 0.0% is not stated. The distribution of the highest level of education attended varies among these sectors, with differences in the percentage of individuals at each education level. For example, Jarama has a higher percentage (30.1%) of individuals who have never attended school compared to other sectors, while Kibungo has a higher percentage (9.1%) of individuals attending upper secondary school and the highest percentage (6.5%) attending university. Each sector has its own unique distribution of education levels attended by the population.

Table 38: Resident population of Ngoma District aged 3 plus by highest level of school attended

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
Rwanda	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Ngoma District	361,690	100	17.7	2.4	65.3	0.6	8.0	4.4	1.6	0.0

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/Vocational	Lower secondary	Upper secondary	University	Not stated
Gashanda	16,914	100	15.1	1.8	72.4	0.7	6.2	3.1	0.8	-
Jarama	27,681	100	30.1	1.7	59.1	0.3	5.4	2.7	0.7	0.0
Karembo	15,863	100	14.7	1.7	68.8	0.6	8.1	4.5	1.6	-
Kazo	28,981	100	15.9	1.8	67.8	0.6	8.1	4.1	1.7	-
Kibungo	28,779	100	12.4	3.5	56.5	1.1	10.8	9.1	6.5	0.1
Mugesera	25,356	100	14.3	1.6	71.5	0.6	7.5	3.6	0.9	0.0
Murama	23,903	100	13.8	2.9	67.1	0.5	10.0	4.7	1.0	0.0
Mutenderi	22,112	100	14.4	2.1	69.9	0.6	8.2	3.8	0.9	0.0
Remera	29,558	100	16.9	3.0	61.1	0.6	9.6	6.1	2.7	0.0
Rukira	26,624	100	14.0	2.9	65.8	0.6	9.8	5.4	1.5	0.0
Rukumberi	35,647	100	25.0	3.1	61.4	0.5	6.3	2.9	0.7	-
Rurenge	29,672	100	17.1	2.0	68.3	0.5	8.0	3.5	0.7	0.0
Sake	25,768	100	22.7	1.6	63.3	0.4	6.8	4.1	1.1	-
Zaza	24,832	100	16.0	2.3	69.2	0.9	6.8	3.6	1.2	0.0

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

e. Means of livelihoods

In Ngoma District, there are 638,806 agricultural households, accounting for 72.1% of all households in the province. In Ngoma district 417,831 or 47.2% are engaged in livestock husbandry. Within Ngoma District specifically, 85,032 households which represent 82.9% of the total private households, are engaged in agriculture. Furthermore, 59,350 households, or 57.9% of all households in Ngoma District, are involved in livestock husbandry. Looking at specific sectors within Ngoma District, it is evident that there is variation in the prevalence of livestock husbandry. Sectors like Gashanda, Karembo and Mutenderi have particularly high percentages of households engaged in livestock husbandry, ranging from 66.9% to 67.9%. On the other hand, sectors like Rukumberi and Kibungo have relatively lower percentages, at 42.9% and 46.2% respectively. Gashanda has the highest percentage of households engaged in crop farming among all sectors within Ngoma District, with 87.7%. Mutenderi and Karembo sectors also demonstrate a significant involvement in crop farming, with 87.6% and 86.8% of households engaged in this activity, respectively.

It was also revealed that the employment to population ratio is 46.0 percent among people residing in Ngoma District, it is higher in urban areas of Ngoma (54.8 percent) than in rural areas of Ngoma (49.4 percent). The employment to population ratio among males as well as females increases from age group 16-19 to 35-44 and starts decreasing from age group 45-49 to 85 years and above as people starts getting very older and retire. It was observed that in district of Ngoma, the highest employment to population ratio among males stands at 63.8% and was observed in age group 35-39, On the other side the highest employment to population among females is 50.7% and was observed in the age group 35-39 years. The lowest employment to population ratio among males stands at 9.9% and was observed among males in the age group of 85 years and above, the lowest employment to population ratio among females is 6.7% and was observed among females in the age group 85+.

Table 39: Distribution of household engaged in livestock husbandry in Ngoma District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,928	62.6	1,669,273	50.4
Eastern Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Ngoma District	102,589	85,032	82.9	79,368	77.4	59,350	57.9
Gashanda	5,060	4,618	91.3	4,436	87.7	3,386	66.9
Jarama	7,753	5,853	75.5	5,262	67.9	3,878	50.0
Karembo	4,481	4,031	90.0	3,889	86.8	3,038	67.8
Kazo	8,271	7,320	88.5	7,018	84.9	5,332	64.5
Kibungo	7,750	5,314	68.6	4,714	60.8	3,584	46.2
Mugesera	7,456	6,271	84.1	5,757	77.2	4,608	61.8
Murama	6,964	6,231	89.5	5,947	85.4	4,602	66.1
Mutenderi	6,437	5,860	91.0	5,641	87.6	4,372	67.9
Remera	8,265	6,565	79.4	6,102	73.8	4,249	51.4
Rukira	7,489	6,185	82.6	5,671	75.7	4,592	61.3
Rukumberi	9,990	7,380	73.9	6,733	67.4	4,281	42.9
Rurenge	8,472	7,624	90.0	7,330	86.5	5,356	63.2
Sake	7,180	5,874	81.8	5,441	75.8	3,839	53.5
Zaza	7,021	5,906	84.1	5,427	77.3	4,233	60.3

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

f. Health, water supply and sanitation facilities

In Ngoma District 95.8% are using Mutuelle as main health insurance, 3% using RSSB or RAMA, 0.1% using private insurance, 0.0% using school insurance, 0.0% using NGOs insurance and 1% using employer insurance.

The results of 5RPHC 2022 reveal that Ngoma District has a slightly higher percentage (83.5%) of households with access to improved drinking water sources compared to the overall percentage for Rwanda (82.3%) and Eastern Province (81.1%). When examining the sectors within Ngoma District, Gashanda has the highest percentage (98.1%) of households with access to improved drinking water sources. The table indicates that only 43.7% of private households in Rukumberi have access to improved drinking water sources (the lowest compared to other sectors), while the majority (56.3%) of households rely on unimproved sources indicating a significant water access challenge in that sector.

In Ngoma District, in urban areas, 93.4% of households rely on improved drinking water sources, while only 6.6% use unimproved sources. In contrast, in rural areas, the percentage of households relying on improved drinking water sources is slightly lower at 82.5% than in urban areas. Additionally, 17.5% of rural households still depend on unimproved sources for their drinking water needs.

g. Appliance and assets ownership

When examining the percentage of private households in Ngoma District possessing communication assets, the percentage of households owning at least one radio (including radio functionality on phones) ranges from 65.9% (Jarama) to 87.3% (Kibungo) across the sectors of Ngoma District. Kibungo sector has the highest percentage of households owning radios (87.3%). The percentage of households owning at least one

television ranges from 3.6% (Mutenderi) to 19.9% (Kibungo) across the sectors. Kibungo sector stands out with the highest percentage, suggesting a relatively higher prevalence of television ownership in that area compared to others. The percentage of the population (10+ years) owning mobile phones ranges from 60.4% (Jarama) to 84.2% (Kibungo). Kibungo sector has the highest mobile phone ownership. The percentage of the population (10+ years) owning a smart mobile device range from 7.7% (Mugesera) to 32.1% (Kibungo). Once again, Kibungo sector has the highest ownership percentage. The percentage of households owning at least one computer ranges from 0.4% (Mugesera) to 7.0% (Kibungo). Kibungo sector generally stands out with higher percentages of households owning radios, televisions, mobile phones, smart mobile devices, and computers.

Table 40: Percentage of private households and of Ngoma District possessing electrical appliance

Sectors and area of residence	Total Number of Private	% 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
Eastern Province	886,132	80.3	9.3	76.5	16.4	2.1
Ngoma	102,589	76.2	7.3	71.4	13.0	1.4
Gashanda	5,060	73.4	3.7	68.1	8.9	0.7
Jarama	7,753	65.9	3.7	60.4	8.5	0.6
Karembo	4,481	77.9	5.6	72.2	11.9	0.9
Kazo	8,271	77.8	6.1	72.6	13.8	1.1
Kibungo	7,750	87.3	19.9	84.2	32.1	7.0
Mugesera	7,456	70.9	5.3	66.0	7.7	0.4
Murama	6,964	82.8	6.4	77.5	13.3	0.5
Mutenderi	6,437	75.8	3.6	71.2	9.9	0.8
Remera	8,265	80.6	13.6	76.3	19.9	2.9
Rukira	7,489	83.0	8.7	79.1	15.1	1.0
Rukumberi	9,990	69.6	5.5	64.3	7.8	0.6
Rurenge	8,472	76.5	4.3	71.6	9.2	0.5
Sake	7,180	71.0	7.0	66.3	11.7	1.0
Zaza	7,021	75.4	6.0	70.2	10.0	0.8

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

h. Access to energy for lighting and cooking

According to the data, in Ngoma District Electricity is the main source of energy for lighting in households, accounting for 58.3% of households. At the sector level within Ngoma District, there are notable variations in the distribution of the main source of energy for lighting. The Kibungo sector has a high reliance on electricity for lighting, with 81.8% of households using this source. This is significantly higher than the district average (58.3%). Other sectors, such as Rurenge (49.6%) and Jarama (45.1%), have relatively lower usage of electricity but still lower than the district average (58.3%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Jarama (43.5%) and Rukumberi (42.3%).

According to the area of residence, in the urban areas of Ngoma District, electricity is the dominant source of energy for lighting, accounting for 79.0% of households. Flashlight/Phone flashlight is the second most common source of lighting, with 14.1% of households relying on this alternative. Candles, firewoods, batteries/bulbs, lanterns, and other lighting sources have relatively lower percentages, indicating their limited usage in urban areas. In rural areas, electricity usage drops significantly to 56.2% of households, indicating lower access to electricity infrastructure compared to urban areas. Flashlight/Phone flashlight becomes the most prevalent source of lighting in rural areas, with 32.7% of households relying on this alternative. This highlights the reliance on portable and off-grid lighting solutions due to limited access to electricity. Candles,

firewoods, batteries/bulbs, lanterns, and other lighting sources have higher percentages compared to urban areas, suggesting a greater reliance on traditional and non-electric lighting methods in rural areas.

Table 41: Distribution of households of Ngoma District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Batteries	Lantern	Other source of energy for Lighting
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
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	1.8	0.5
Ngoma	102,589	100	58.3	1.4	0.0	1.8	1.1	1.5	31.1	0.1	4.1	0.6
Ngoma urban	9,196	100	79.0	0.8	0.0	2.5	0.4	0.2	14.1	0.1	2.6	0.4
Ngoma rural	93,393	100	56.2	1.4	0.0	1.7	1.2	1.7	32.7	0.1	4.3	0.6
Gashanda	5,060	100	53.3	1.4	0.0	1.3	1.5	3.1	34.3	0.1	4.5	0.5
Jarama	7,753	100	45.1	0.3	-	1.6	2.8	3.9	43.5	0.4	1.5	0.9
Karembo	4,481	100	59.8	0.7	-	0.9	0.9	0.2	34.0	0.1	3.0	0.4
Kazo	8,271	100	52.9	1.5	0.0	1.9	0.8	2.1	33.7	0.2	6.4	0.5
Kibungo	7,750	100	81.8	1.4	-	2.1	0.3	0.2	10.3	0.1	3.5	0.2
Mugesera	7,456	100	47.4	1.3	-	1.5	1.5	1.9	41.3	0.1	4.1	0.8
Murama	6,964	100	74.1	2.4	-	1.3	0.4	0.8	16.0	0.2	4.0	0.9
Mutenderi	6,437	100	54.7	1.1	0.0	0.7	0.8	0.8	37.6	0.2	3.7	0.5
Remera	8,265	100	66.0	2.6	-	2.0	0.8	1.7	22.0	0.2	3.6	1.0
Rukira	7,489	100	74.0	2.6	0.0	1.2	0.6	0.3	15.7	0.1	4.9	0.5
Rukumberi	9,990	100	50.4	0.3	0.0	3.0	1.3	1.3	42.3	0.1	1.0	0.4
Rurenge	8,472	100	49.6	1.4	0.0	2.5	0.9	1.2	36.4	0.1	7.4	0.5
Sake	7,180	100	51.4	0.8	0.0	2.2	1.3	2.5	37.5	0.1	3.7	0.6
Zaza	7,021	100	57.5	1.3	-	1.9	1.9	1.3	28.9	0.1	6.7	0.4

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

In Rwanda as a whole, firewood is the primary source of energy for cooking, accounting for 76.1% of households. Charcoal is the second most common source of energy, with 17.3% of households using it for cooking. Gas has relatively lower percentages (4.6%), indicating limited access to modern energy sources for cooking. In the Eastern Province, similar to the national level, firewood is the dominant source of energy for cooking, with 83.8% of households using it. Charcoal and gas follow, with 10.0% and 3.2% of households utilizing these energy sources for cooking, respectively. Overall, firewood remains the predominant source of energy for cooking in Ngoma District (93.1%). At sector level, Gashanda, Jarama, and Mugesera have relatively higher percentages of firewood usage for cooking, ranging from 97.1% to 96.8%. The Kibungo sector stands out with a higher usage of charcoal (20.2%) compared to other sectors.

By area of residence of Ngoma District, firewood usage is substantially higher in rural areas (95.4%) compared to urban areas (69.8%). This indicates a greater reliance on traditional biomass fuels for cooking in rural households. Charcoal usage is more prevalent in urban areas (22.7%) compared to rural areas (2.6%), suggesting relatively better access to alternative cooking fuels in urban settings. Gas usage is also more pronounced in urban areas (5.5%) compared to rural areas (0.4%), indicating a higher availability or adoption of modern cooking technologies in urban households. The percentage of households with no cooking option is similar in both urban (1.8%) and rural (1.5%) areas.

i. Vulnerability

The prevalence rates of vulnerability in Ngoma District highlight variations across different sectors. Gashanda Sector has the highest prevalence rate at 5.0%, followed closely by Zaza Sector with a rate of 4.6%. On the other hand, Murama Sector has the lowest prevalence rate at 2.8%, while Rurenge Sector has a relatively low rate of 3.0%.

Table 42: Persons with vulnerability of Ngoma District by Sector of residence and sex

Sectors of residence	Total resident population	Person's with Vulnerability			Prevalence of vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Ngoma District	351,525	13,165	5,797	7,368	3.7
Gashanda	16,687	834	349	485	5
Jarama	26,675	1,036	452	584	3.9
Karembo	15,364	494	229	265	3.2
Kazo	28,338	1,147	509	638	4
Kibungo	27,848	963	418	545	3.5
Mugesera	25,197	874	402	472	3.5
Murama	23,427	666	284	382	2.8
Mutenderi	21,730	1,012	449	563	4.7
Remera	28,333	884	386	498	3.1
Rukira	26,093	976	417	559	3.7
Rukumberi	33,575	1,370	606	764	4.1
Rurenge	29,075	860	397	463	3
Sake	24,997	946	413	533	3.8
Zaza	24,186	1,103	486	617	4.6

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

4.6. Kirehe District

4.6.1. Physical environment

a. Location

Kirehe District is one of the seven districts making up the Eastern province extended over a total area of 1,118.5 Km². It is made up of twelve administrative sectors and borders with Tanzania in the East with the Districts of Ngara and Karagwe, in the south the district borders with Burundi, Ngoma District in the south-western part and Kayonza District in the North.

b. Topography

the of the district relief is that of a low plateau area. However, there exists a chain of mountains, which divide the region into two geographical entities; these are characterized by a low altitude plain of more or less than 1,350m of altitude, separated by isolated hills and mountains with a plateau at the summits of Mountain Mahama and Mountain Migongo. The average of the district is 1500m above sea level.

c. Climate and Rainfall

The District of Kirehe has 4 climatic intervals of seasons per year. The average annual temperature is 19.4 °C. The rainfall here averages 898mm and an average of 20.2 °C, September is the warmest month. June has the lowest average temperature, which is 18.9 °C while the precipitation varies 148 mm between the driest month and the wettest month. During the year, the average temperatures vary by 1.3 °C. The tropical

land relief is more widespread in the district. It is composed of different types of soil components that combine at a lenient level; all these grounds can be exploited and improved on its production.

d. Geology and soils

The geology of Bugesera District is primarily composed of sedimentary rocks and volcanic rocks. The district lies within the Central East Rwandan sedimentary basin, which includes formations from the Tertiary and Quaternary periods. The area features sedimentary rock formations such as sandstones and shales, which have been deposited over time by sedimentation processes in ancient lakes and river systems. The soils are largely derived from the underlying geology, including lateritic soils, which are typically reddish and rich in iron and aluminum oxides. These soils are well-drained and often used for agriculture.

e. Hydrography

Kirehe District is traversed by several significant rivers and streams. The most notable river is the Akagera River, which forms part of the district's eastern boundary and flows into the larger Nile River system. The Akagera River is a crucial water source for the district, supporting agriculture, livestock, and local communities. Other important rivers include the Muvumba and the Akagera's tributaries, which contribute to the district's hydrographic network. While the District is not particularly known for large lakes, it does have numerous small lakes and wetlands scattered throughout the area. These wetlands are essential for maintaining the ecological balance, supporting biodiversity, and providing water for irrigation and other uses. The wetlands also play a role in flood control and groundwater recharge.

4.6.2. Ecological characteristics

Kirehe District, boasts a rich variety of flora and fauna shaped by its diverse ecosystems, including wetlands, savannas, and gallery forests. The district's proximity to the Akagera National Park further enhances its biodiversity.

a. Flora

The dominant flora species of the district are:

Wetlands and riparian zones: The Akagera River and its associated wetlands in Kirehe support a variety of moisture-loving plants. Notably, the Cyambwe Lake area is densely vegetated with papyrus (*Cyperus papyrus*), providing critical habitat for aquatic life. Other wetlands in Kirehe district, such as the Akagera wetlands, are crucial for water purification, flood mitigation, and supporting aquatic biodiversity. They are characterized by plant species like *Polygonum senegalensis*, *Cyperus latifolius*, *Cyperus papyrus*, and *Juncus oxycarpus*. However, these wetlands face threats from activities like agriculture and invasive species, including *Eichhornia crassipes* and *Mimosa pigra*.

Gallery forests: Along the Akagera River, gallery forests are present, characterized by species such as the Senegal date palm (*Phoenix reclinata*) and the butterfly pea (*Aeschynomene elaphroxylon*). These forests are vital for maintaining ecological balance and supporting diverse wildlife.

Savannahs and Woodlands: The district's savannahs and woodlands support various plant and animal species. The Akagera National Park, encompassing parts of Kirehe, features savannas intersected by forest strips and wetlands along the Akagera River. Woodland areas within the park are dominated by species like *Albizia amara* and *Albizia petersiana*, though they constitute a small fraction of the park's area.

b. Fauna

Birdlife: Kirehe is part of Rwanda's eastern region, renowned for its rich bird diversity. Over 500 bird species have been documented in the country, with gallery forests in Kirehe supporting numerous avian species.

Aquatic Life: The Cyambwe Lake hosts various fish species, including cichlids. The lake's dense papyrus vegetation provides breeding grounds and shelter for these aquatic species.

Reptiles and Amphibians: The district's wetlands and forests are habitats for reptiles like crocodiles and amphibians such as the spotted-necked otter (*Hydricis maculicollis*). These species contribute to the ecological richness of the area.

Mammals: Kirehe District has thriving populations of lion, leopard, elephant, rhino, and buffalo, as well as zebra, giraffe, antelope especially its eastern part which encompasses a portion of the Akagera National Park. (it is worth indicating that the project will not be implemented within the park).

4.6.3. Socio-economic characteristics

a. Population

The 5th Rwanda Population and Housing Census (PHC5) has enumerated 460,860 residents in Kirehe District, which represent 12.9% of the total population of the Eastern Province (3,563,145 residents). The population of Kirehe District is predominantly female: 239,097 are women corresponding to 51.9% of the total population of Kirehe District. Females are predominant in all sectors of the district. Mahama (81,014 population) is the most populated sector. Its population represents 17.6% of the total population of Kirehe District. The two less populated sectors are Nyarubuye (22,660 inhabitants) and Kirehe (29,547 inhabitants). They represent 4.9 and 6.4% of the total resident population of Kirehe District, respectively.

Table 43: Population of Kirehe 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	-
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	-
Kirehe district	460,860	221,763	239,097	100	48.1	51.9	100
Gahara	44,462	21,105	23,357	100	47.5	52.5	9.6
Gatore	31,687	15,055	16,632	100	47.5	52.5	6.9
Kigarama	37,136	17,878	19,258	100	48.1	51.9	8.1
Kigina	34,642	16,666	17,976	100	48.1	51.9	7.5
Kirehe	29,547	13,997	15,550	100	47.4	52.6	6.4
Mahama	81,014	39,579	41,435	100	48.9	51.1	17.6
Mpanga	40,173	19,480	20,693	100	48.5	51.5	8.7
Musaza	30,095	14,355	15,740	100	47.7	52.3	6.5
Mushikiri	32,841	15,833	17,008	100	48.2	51.8	7.1
Nasho	33,665	16,077	17,588	100	47.8	52.2	7.3
Nyamugari	42,938	20,867	22,071	100	48.6	51.4	9.3
Nyarubuye	22,660	10,871	11,789	100	48	52	4.9

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

The results of Rwanda Population and housing census 2022 revealed that, the total population of Rwanda are spatially distributed in rural area that represent 72.1% and urban area represent 27.9%. The Eastern Province is predominantly by the urban area (86.9%) and rural area (13.1%). Kirehe District population is predominantly by rural area 93.7% while urban represents 6.3%. The sectors of Kirehe District which are entirely rural are Gahara, Gatore, Kigarama, Mpanga, Musaza, Mushikiri and Nyarubuye are entirely while the remaining are somehow urban.

b. Number of households and size of household

The results of 5th RPHC 2022 indicate the total of 113,886 households in Kirehe District. The average household size in Kirehe District is 4.0 persons per household. The smallest household sizes are found in Kigarama, Kigina and Kirehe (3.9 persons/household each). In Kirehe District, private households headed by females are 30.8%. At sector level, the highest percentage of households headed by women is found in Mahama sector (40.9%) while the lowest is found in Nasho sector (25.9%).

Table 44: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ¹	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
Eastern Province	886,132	3,521,227	4.0	70.4	29.6
Kirehe District	113,886	459,566	4.0	69.2	30.8
Gahara	11,038	44,429	4.0	69.0	31.0
Gatore	7,856	31,656	4.0	69.9	30.1
Kigarama	9,423	37,115	3.9	72.0	28.0
Kigina	8,911	34,557	3.9	70.4	29.6
Kirehe	7,621	29,448	3.9	71.2	28.8
Mahama	18,892	80,851	4.3	59.1	40.9
Mpanga	9,840	39,743	4.0	71.8	28.2
Musaza	7,603	30,067	4.0	71.6	28.4
Mushikiri	8,244	32,819	4.0	71.6	28.4
Nasho	8,400	33,645	4.0	74.1	25.9
Nyamugari	10,540	42,635	4.0	71.6	28.4
Nyarubuye	5,518	22,601	4.1	69.4	30.6

¹ This population does not include the resident population from Institutional Households

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

c. Housing characteristics

The results of 5th Population and Housing Census 2022 revealed that in the Eastern Province the predominant type of habitat is Umudugudu (Planned rural settlement) housing with 86.5%. The most common type of habitat in Kirehe District is also the Umudugudu (Planned rural settlement) housing with 87.8%, followed by old settlement (7.9%) and dispersed or isolated housing (1.0%). At sector level, the Umudugudu (Planned rural settlement) housing type of habitat is most prevalent in Nyarubuye (99.0%) and it is also more than 90% in the remaining sectors except in Mahama where it occupies 40.5%. The sectors with the high percentages of old settlement housing units are Mahama (56.4%). The integrated model village type of habitat is more found in Nasho (1.8%) and Kigina (1.5%). The dispersed/ isolated housing type is more found in Mushikiri (2.5%), Gahara (2.2%) and Nasho (2.1%). The Table below displays results by sector.

Table 45: Distribution of households in Kirehe District by type of habitat

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu (Planned rural settlement)	Integrated model	Old settlement	Dispersed / Isolated housing	Modern planned	Spontaneous / squatter	Other type	Not stated
Rwanda	3,312,743	100	65.4	0.8	2.3	14.9	6.9	8.9	0.8	0.0
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Kirehe District	113,886	100	87.8	0.4	9.7	1.0	0.3	0.1	0.5	0.0
Kirehe Urban	7,700	100	94.4	1.8	0.0	1.0	2.1	0.6	0.1	0.0
Kirehe Rural	106,186	100	87.4	0.3	10.5	1.0	0.1	0.1	0.6	0.0
Gahara	11,038	100	97.7	0.1	0.0	2.2	0.0	0.0	0.0	0.0
Gatore	7,856	100	98.4	0.1	0.2	1.1	0.1	0.1	0.1	0.0
Kigarama	9,423	100	98.7	0.2	0.0	0.8	0.1	0.0	0.1	0.0
Kigina	8,911	100	97.3	1.5	0.2	0.6	0.0	0.4	0.0	0.0

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu (Planned rural settlement)	Integrated model village	Old settlement	Dispersed / Isolated housing	Modern planned urban housing	Spontaneous/squatter housing	Other type of housing	Not stated
Kirehe	7,621	100	94.1	0.2	0.0	1.6	3.7	0.2	0.1	0.0
Mahama	18,892	100	40.5	0.1	56.4	0.1	0.0	0.0	2.9	0.0
Mpanga	9,840	100	97.0	1.0	1.7	0.3	0.0	0.0	0.1	0.0
Musaza	7,603	100	98.5	0.1	0.1	0.7	0.0	0.5	0.1	0.0
Mushikiri	8,244	100	96.5	0.2	0.3	2.5	0.0	0.4	0.0	0.0
Nasho	8,400	100	95.0	1.8	1.0	2.1	0.0	0.0	0.0	0.0
Nyamugari	10,540	100	97.7	0.1	1.1	0.8	0.0	0.2	0.1	0.0
Nyarubuye	5,518	100	99.0	0.1	0.1	0.5	0.0	0.1	0.2	0.0

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

By area of residence, in urban areas, the predominant types are umudugudu/Planned rural settlement (94.4%), followed by modern planned urban housing (2.1%) and integrated model village (1.8%). In rural areas, the predominant type is umudugudu/Planned rural settlement (87.4%), followed by old settlement (10.5%).

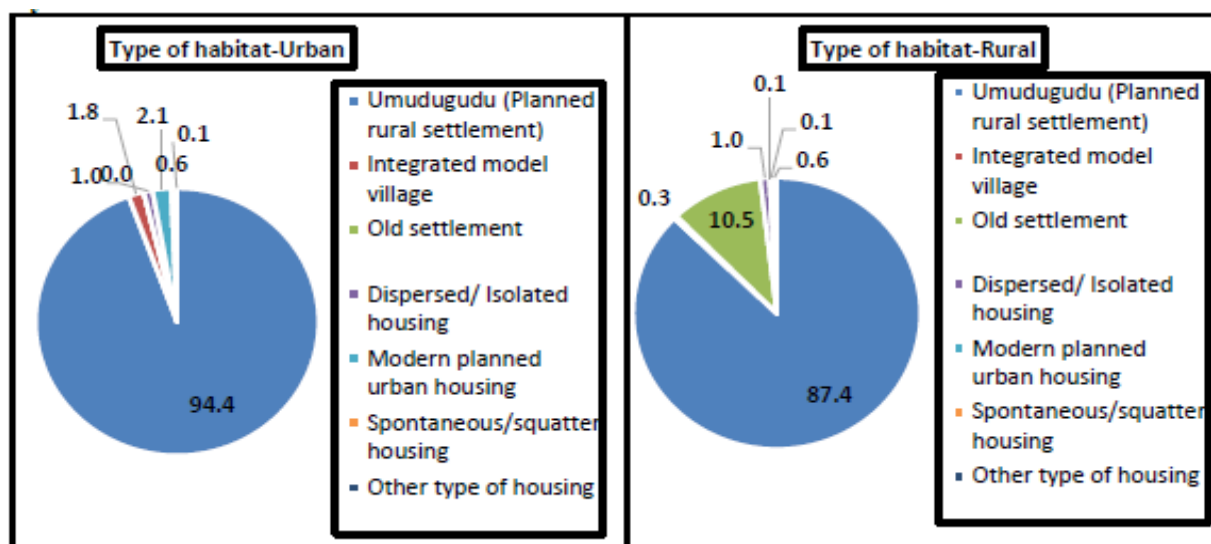


Figure 2: Distribution of households in Kirehe District by type of habitat.

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

d. Appliance and assets ownership

At the district level, 80.7% of private households possess a radio, 76.9% a mobile phone, 14.4% a smartphone, 5.6% a TV and 1.1% a computer. At sector level, the percentage of private households possessing a radio is high in Kirehe (84.8%), Kigina (84.2%) and Gatore (82.9%). It is low in Kigarama (77.2%) and Gahara (77.6%). The percentage of private households possessing a television is high in Kirehe (11.1%) and Kigina (10.2%) and Nasho (9.1%) while it is low in Mahama (2.0%) and Kigarama (3.3%). Mobile phone is mostly possessed by private households of Kirehe (81.9%), Kigina (79.3%) and Gatore (79.3%). The sectors with high percentage of households with smartphone are Kirehe (22.7%), Mahama (22.2%) and Kigina (20.2%) while the percentage of households possessing this asset is low in Gahara (8.6%). The computer is mostly possessed in Kirehe (3.7%) Kigina (2.5%) while the low percentage of households possessing computer is Mushikiri (0.4%).

Table 46: Percentage of private households possessing electrical appliance

Sectors and area of residence	Total Number of Private	% 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
Eastern Province	886,132	80.3	9.3	76.5	16.4	2.1
Kirehe District	113,886	80.7	5.6	76.9	14.4	1.1
Gahara	11,038	77.6	4.1	73.5	8.6	0.6
Gatore	7,856	82.9	6.6	79.3	14.8	1.2
Kigarama	9,423	77.2	3.3	72.3	8.9	0.6
Kigina	8,911	84.2	10.2	79.9	20.2	2.5
Kirehe	7,621	84.8	11.1	81.9	22.7	3.7
Mahama	18,892	80.4	2.0	78.4	22.2	0.9
Mpanga	9,840	79.5	3.7	74.9	9.7	0.7
Musaza	7,603	79.3	4.1	75.0	10.8	0.5
Mushikiri	8,244	80.7	6.0	76.4	10.1	0.4
Nasho	8,400	82.0	9.1	78.2	12.3	1.0
Nyamugari	10,540	80.6	6.4	76.2	13.7	1.2
Nyarubuye	5,518	81.6	5.6	77.9	12.4	0.7

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

e. Education

The results of 5RPHC-2022 indicate that, among the population aged 3 years and above in Kirehe District, 18.6% of them has never attended any formal school, 61.3% attended the primary level, 9.4% attended lower secondary level, 5.5% has attended upper secondary and 1.5% attended university level. The level of educational attainment varies across sectors, Mushikiri is highest percentage of primary school attendance (68.6%), Mahama is highest in both lower secondary school and upper secondary school attendance (12.3% and 9.7% respectively). Kirehe has a high percentage of 3.2% of the population attended University than other sectors.

Table 47: Resident population of Kirehe District aged 3 plus by highest level of school attended

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBO KA/Vocat	Lower secondary	Upper secondary	University	Not stated
Rwanda	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Kirehe District	417,211	100	18.6	3.2	61.3	0.4	9.4	5.5	1.5	0.0
Gahara	40,772	100	21.5	2.3	63.2	0.2	8.2	3.9	0.8	0.0
Gatore	28,898	100	18.0	2.3	62.3	0.5	9.5	5.4	1.9	0.0
Kigarama	33,660	100	23.3	2.3	64.3	0.2	6.5	2.8	0.6	0.0
Kigina	31,440	100	17.2	2.5	61.2	0.6	9.3	6.1	3.1	0.0
Kirehe	26,948	100	15.3	3.5	58.7	0.6	11.5	7.2	3.2	0.0
Mahama	71,829	100	18.0	6.3	51.2	0.5	12.3	9.7	2.0	0.0
Mpanga	36,583	100	19.3	2.5	62.8	0.4	9.4	4.7	1.0	0.0
Musaza	27,131	100	18.8	2.8	63.0	0.4	9.6	4.5	0.8	0.0
Mushikiri	29,731	100	16.2	2.7	68.6	0.5	7.6	3.7	0.7	0.0
Nasho	30,554	100	16.7	2.2	66.9	0.3	7.7	4.6	1.4	0.0
Nyamugari	39,140	100	20.3	2.9	61.7	0.5	8.6	4.8	1.2	0.0

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBO KA/Vocat	Lower secondary	Upper secondary	University	Not stated
Nyarubuye	20,525	100	17.1	2.4	65.2	0.8	9.3	4.3	1.0	0.0

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

f. Means of livelihoods

In Kirehe district, agricultural households represent 74.1% with 68.8% of households engaged in crop farming and 51.5% in Livestock husbandry. At the sector level, the highest percentages of agricultural households are found in Nyarubuye(85.1 %), Mushikiri(88.1%), Gahara(86.4%) and Kigarama(86.3%). Households engaged in crop farming are more represented in Nyarubuye (80.4%), Kigarama(82.1%), Mushikiri(81.6%) and Gahara (80.4%) while those engaged in livestock husbandry are in Mushikiri (66.1%), Nyarubuye(63.4%) and Musaza(61.2%).

It was also revealed that the employment to population ratio is 43.8 percent among people residing in Kirehe districts, it is higher in urban areas of Kirehe (55.2 percent) than in rural areas of Kirehe (43.0 percent). The employment to population ratio among males increases from age group 16-19 to 30-34 and then, it starts to decreasing from this age group. Among females, it increases from age group 16-19 to 35-39. It was observed that in district of Kirehe, the highest employment to population ratio among males stands at 70.6% and it was observed in age group 30-34, On the other side the highest employment to population among females is 53.5% and it was observed in the age group 35-39. The lowest employment to population ratio among males stands at 9.6% and stands at 6.0% among females in the age group 85+.

Table 48: Distribution of household engaged in livestock husbandry in Kirehe District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,928	62.6	1,669,273	50.4
Eastern Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Kirehe district	113,886	84,424	74.1	78,384	68.8	58,641	51.5
Gahara	11,038	9,539	86.4	8,874	80.4	6,855	62.1
Gatore	7,856	6,604	84.1	6,142	78.2	4,720	60.1
Kigarama	9,423	8,132	86.3	7,735	82.1	5,671	60.2
Kigina	8,911	6,616	74.2	6,131	68.8	4,290	48.1
Kirehe	7,621	5,814	76.3	5,383	70.6	3,946	51.8
Mahama	18,892	5,599	29.6	5,064	26.8	3,668	19.4
Mpanga	9,840	8,098	82.3	7,467	75.9	5,577	56.7
Musaza	7,603	6,389	84.0	5,855	77.0	4,651	61.2
Mushikiri	8,244	7,263	88.1	6,726	81.6	5,453	66.1
Nasho	8,400	6,925	82.4	6,458	76.9	4,700	56.0
Nyamugari	10,540	8,520	80.8	7,853	74.5	5,609	53.2
Nyarubuye	5,518	4,925	89.3	4,696	85.1	3,501	63.4

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

g. Health, water supply and sanitation facilities

In Kirehe District 84.9% are using Mutuelle as main health insurance, 2.4% using RSSB or RAMA, 0.3% using private insurance, 0.0% using school insurance, 11.7% using NGOs insurance and 0.7% using employer insurance.

In Kirehe District, 80.7% of private households use improved water sources. At the sector level, the percentages of the private households using water from improved drinking sources are highest in Mahama (99.6%) and Kigarama (90.2%) and the lowest percentage is in Nyarubuye (60.5%).

In both urban and rural areas of Kirehe district, private households use mainly improved drinking water source (99.3% in urban and 79.4% in rural). The percentage of private households using unimproved drinking water source is higher in rural (20.6%) than in urban (0.7%).

h. Access to energy for lighting and cooking

In Kirehe district, the main source of energy for lighting used by households is electricity (57.1%), followed by flashlight/phone flashlight (33.3%). At the sector level, the percentage of households using electricity for lighting is high in Gahara (70.3%) and Musaza while it is low in Mahama, the only sector where the percentage of private households using electricity is less than 50%(36.4%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Mahama (50.5%), Nyamugari (37.1%), Kigarama (36.9%), Mpanga and Nasho (36.3% each).

According to the area of residence, the main source of energy for lighting is electricity (55.8%), followed by flashlight/phone flashlight (34.3%), lantern (3.0%) and candles (2.4%) in rural areas. In urban areas, 75.3% of private households use electricity as main source of energy for lighting, while 19.1% use flashlight or phone flashlight, 2.1% use flashlight/phone flashlight and 1.6% use candles.

Table 49: Distribution of households by main source of energy for lighting

Sector and of residence	Total number of private households	Total	Electricity	Kerosene/Paffin lamp	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone	Rechargeable Batteries	Lantern	Other source of energy for
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
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	1.8	0.5
Kirehe District	113,886	100	57.1	0.9	0.0	2.4	1.4	1.3	33.3	0.3	2.9	0.4
Kirehe Urban	7,700	100	75.3	0.5		1.6	0.6	0.5	19.1	0.1	2.1	0.3
Kirehe Rural	106,186	100	55.8	0.9	0.0	2.4	1.4	1.4	34.3	0.3	3.0	0.4
Gahara	11,038	100	70.3	0.6	0.0	1.0	4.1	0.6	21.6	0.1	1.4	0.4
Gatore	7,856	100	63.9	1.1	-	1.3	1.7	0.9	25.4	0.1	5.2	0.4
Kigarama	9,423	100	54.5	0.4	-	1.4	1.5	1.8	36.9	0.1	3.0	0.3
Kigina	8,911	100	63.4	0.9	-	1.8	0.7	1.1	27.5	0.1	3.9	0.5
Kirehe	7,621	100	60.8	2.5	0.0	2.2	1.4	1.1	23.9	0.2	7.4	0.4
Mahama	18,892	100	36.4	0.7	0.0	6.6	0.7	1.9	50.5	0.8	1.4	0.9
Mpanga	9,840	100	56.8	0.8	0.1	1.0	1.2	0.9	36.3	0.2	2.4	0.2
Musaza	7,603	100	69.5	0.4	-	1.0	1.4	2.2	23.2	0.1	1.9	0.3
Mushikiri	8,244	100	64.4	2.4	-	0.8	0.8	0.9	25.9	0.1	4.4	0.2
Nasho	8,400	100	55.5	0.7	-	1.3	0.5	1.7	36.3	0.2	3.5	0.4
Nyamugari	10,540	100	53.9	0.4	0.0	3.7	1.7	1.0	37.1	0.2	1.7	0.4
Nyarubuye	5,518	100	61.8	0.6	0.0	0.6	1.1	0.7	33.4	0.1	1.4	0.2

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 (83.8%) followed by gas (11.1%) and charcoal (3.0%). At the sector level, firewood is the most used source of cooking energy by private households at more than 90% in private households of 11 sectors out of 14, more than 80% by private households of 2 sectors while it is less used in Mahama (33.0%). Sector with the highest percentage of private households using gas as main source of cooking energy is Mahama (62.2%). For others sectors, the use is less than 1% except Kirehe and Kigina (2.9% each). Sectors with the high percentage of private households using charcoal as main source of energy for cooking are Kigina (9.3%) and Kirehe (7.7%).

The main sources of energy for cooking used by private households in Kirehe District vary by area of residence. In Rural areas, private households use mostly firewood (84.4%), gas (11.4% and charcoal (2.1%). In urban areas, private households use most firewood (74.2%), charcoal (16.0%) and gas (5.9%).

i. Vulnerability

In Kirehe District, the vulnerability prevalence rate is 3.6%. At sector level, the highest prevalence rates of the resident population aged 5 years and above with disability are in Mahama (4.9%) and Kirehe (4.6%). The lowest is in Mushikiri and Nasho (2.8% each).

Table 50: Persons with vulnerable of Kirehe District by Sector of residence and sex

Sectors of residence	Total resident population	Person with vulnerability			Prevalence of Vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Kirehe district	398,861	14,230	6,409	7,821	3.6
Gahara	38,890	1,299	553	746	3.3
Gatore	27,770	952	415	537	3.4
Kigarama	32,097	1,023	503	520	3.2
Kigina	30,081	993	458	535	3.3
Kirehe	25,821	1,185	477	708	4.6
Mahama	67,942	3,313	1,457	1,856	4.9
Mpanga	35,023	1,070	478	592	3.1
Musaza	26,177	973	449	524	3.7
Mushikiri	28,761	799	362	437	2.8
Nasho	29,338	814	388	426	2.8
Nyamugari	37,144	1,190	591	599	3.2
Nyarubuye	19,817	619	278	341	3.1

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

4.7. Bugesera District

4.7.1. Physical environment

a. Location

Bugesera District is one of the seven Districts that constitute the Eastern Province. The district is composed of 15; 72 Cells and 581 Villages and covers the surface of 1337 km². The district is bordered 6 with Rwamagana District of Eastern Province to its North-East, Nyarugenge and Kicukiro Districts of Kigali City to its North, Kamonyi District of Southern Province to its North West, Ngoma District of Eastern Province to its East, Ruhango and Nyanza Districts southern province to its West, and finally the Republic of Burundi to its South where they are largely blundered with the Lake Rweru and Lake Cyohoha in the South.

b. Topography

The topography of Bugesera District is characterized with a mixture of plateaus with an altitude varying between 1,100 m and 1,780m and undulating hills dominated by varying heights. Most prominent of these

hills are: Juru (1,667m), Nemba (1,625m) and Maranyundo (1,614 m). The relief is also constituted by a succession of low plateaus with hills and dry valleys. The district is equally rich in marshlands alongside rivers; they cover an estimated area of 6,100 ha and are exploited at an average of 46.3%.

c. Climate and Rainfall

Compared to other regions of the country, Bugesera climate is dry with temperature varying between 20 and 30°C. The temperature average range is between 26 and 29°C. In the past the district experienced drought which resulted in hunger emigration. However, with increased government effort, the district had been afforested. Natural resources were also protected. This improved on its climatic conditions. Currently, the district has two dry seasons and two rainy seasons.

d. Geology and Soils

The soils of the district are generally sandy with a low quantity of humus and are very permeable. They dry quickly even after a great rain. In summits of some plateaus located in the centre and the north of the district, the soils are often made of ochre clay, whereas the sides and the tops of the plateaus are made up of rocks and schist which contain gravel, 8 lateritic soil and quartz. They give quarry stones for construction works. In general, soils are more or less fertile but permeable and fragile. The shores of the lakes and marshes give, in some areas, clay which is used in making bricks, tiles and traditional pottery. There are also many kinds of sand used for construction of houses. The soils in the valleys are characterized by their richness in nutritious minerals but often with low content of organic elements and materials. They are hard during the dry season and muddy in the rainy season.

e. Hydrography

Bugesera District hydrographical network is mainly characterized by 3 rivers, namely Akanyaru, Akagera and Nyabarongo. Besides rivers, BUGESERA has 9 lakes however these have little effect on rainfall, but they can be exploited for fishing, tourism, transportation, power generation, agricultural irrigation and farming among others

4.7.2. Ecological characteristics

Bugesera's ecology is influenced by its savannah landscapes, wetlands, and gallery forests. The region's flora and fauna are adapted to these environments, with plant species that are drought-resistant and animal species that thrive in both terrestrial and aquatic habitats. The wetlands, in particular, play a crucial role in supporting biodiversity, especially bird species, and contribute to the overall ecological balance of the district. The Nyabarongo wetlands, which border Bugesera District, are recognized as an Important Bird Area (IBA) by BirdLife International. This area hosts species like the **Madagascar pond-heron** (*Ardeola idae*), **Papyrus gonolek** (*Laniarius mufumbiri*), and **Papyrus yellow warbler** (*Calamonastides gracilirostris*).

a. Flora

The district's vegetation is predominantly savannah, interspersed with steppe-like flora. Key plant species include: (i) Acacia species: Commonly found throughout the region, these trees are well-adapted to the savannah environment, (ii) Euphorbia species: These plants are prevalent in the area, contributing to the district's distinctive vegetation, (iii) Cactus species: adapted to arid conditions, cacti are part of the district's flora; (iv) *Blepharis maderaspatensis*: species observed near the Nemba Airstrip etc. The district also features gallery forests along alluvial plains near lakes, swamps, and marshes. These areas are dominated by *Acacia siberiana* ("umunyinya") and other species such as "umuko," "umuvumu," "umusave," "umusasa," and *Cyperus papyrus* ("urufunzo").

b. Fauna

- Mammals

Bugesera supports a variety of mammals, mainly small to medium-sized species adapted to savannah and wetland ecosystems. Some key species include: Olive baboon (*Papio anubis*) – A highly adaptable primate

found in both forested and open areas, Vervet monkey (*Chlorocebus pygerythrus*) – Common in woodlands and near water bodies, Common duiker (*Sylvicapra grimmia*) – A small antelope species that thrives in savannah and bushland, African hare (*Lepus microtis*) – A nocturnal species commonly found in grasslands, African civet (*Civettictis civetta*) – A nocturnal carnivore often seen in wooded areas.

- Birds

The district is known for its rich avifauna, especially in wetland areas like Lake Rweru, Lake Cyohoha, and associated swamps. Some notable bird species include: African jacana (*Actophilornis africanus*) – Found in wetlands, known for its long toes that help it walk on floating vegetation, Grey crowned crane (*Balearica regulorum*) – A flagship species, often found in marshy areas, Hadada ibis (*Bostrychia hagedash*) – Common in wetlands and near human settlements, White-faced whistling duck (*Dendrocygna viduata*) – Frequently seen in lakes and swamps, Pied kingfisher (*Ceryle rudis*) – Found along lakes and rivers, hunting small fish.

- Reptiles and amphibians

Due to the warm and dry climate of Bugesera, several reptiles and amphibians inhabit the district. These include: Nile monitor (*Varanus niloticus*) – A large lizard often found near water bodies, African rock python (*Python sebae*) – A non-venomous constrictor found in wetlands, Common agama (*Agama agama*) – A brightly colored lizard found in open areas, Bullfrog (*Pyxicephalus edulis*) – A large amphibian found in seasonal wetlands.

- Fish and aquatic life

Bugesera's lakes and wetlands support a range of freshwater fish species, which are vital for local fisheries. Key species include: Nile tilapia (*Oreochromis niloticus*) – A dominant species in lakes and rivers, African catfish (*Clarias gariepinus*) – Found in lakes and slow-moving waters, Barbus species – Small freshwater fish common in streams.

4.7.3. Socio-economic characteristics

a. Population

The 5th Rwanda Population and Housing Census (PHC5) has enumerated 551,103 residents in Bugesera district, which represent 15.5% % of the total population of the Eastern Province (3,563,145 residents). The population of Bugesera district is predominantly female: 279,635 are women corresponding to 50.7 % of the total population Bugesera district. Females are predominant in almost all sectors of the district except in two sectors which are Mayange (49.3% for female versus 50.7% for male) and Rilima (46.3% for female versus 53.7% for male). Nyamata (81,480 population) and Mayange (54,084 population) are the most populated sectors. They represent 14.8% and 9.8% of the total population of Bugesera district, respectively. The three less populated sectors are Shyara (15,856 inhabitants), Kamabuye (24,502 inhabitants) and Nyarugenge (25,406 inhabitants). They represent 2.9%, 4.4% and 4.6% of the total resident population of Bugesera district, respectively.

Table 51: Population of Bugesera District by Sector and sex in 2022

District Sector and	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	-
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	-
Bugesera district	551,103	271,468	279,635	100	49.3	50.7	100
Gashora	32,251	16,027	16,224	100	49.7	50.3	5.9
Juru	33,753	16,443	17,310	100	48.7	51.3	6.1

District Sector and	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Kamabuye	24,502	11,960	12,542	100	48.8	51.2	4.4
Mareba	29,266	14,127	15,139	100	48.3	51.7	5.3
Mayange	54,084	27,433	26,651	100	50.7	49.3	9.8
Musenyi	40,610	19,542	21,068	100	48.1	51.9	7.4
Mwogo	30,171	14,802	15,369	100	49.1	50.9	5.5
Ngeruka	37,328	17,900	19,428	100	48	52	6.8
Ntarama	45,530	22,652	22,878	100	49.8	50.2	8.3
Nyamata	81,480	40,096	41,384	100	49.2	50.8	14.8
Nyarugenge	25,406	12,181	13,225	100	47.9	52.1	4.6
Rilima	32,862	17,652	15,210	100	53.7	46.3	6
Ruhuha	30,028	14,606	15,422	100	48.6	51.4	5.4
Rweru	37,976	18,408	19,568	100	48.5	51.5	6.9
Shyara	15,856	7,639	8,217	100	48.2	51.8	2.9

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

The results of Rwanda Population and housing census 2022 revealed that, the total population of Rwanda are spatially distributed in rural area that represent 72.1% and urban area represent 27.9%. The Eastern Province is also predominantly rural area (79.1%) while urban area represents 20.9%. Bugesera district population is predominantly rural area 59.9% while urban represents 40.1%. The sectors of Bugesera district which are entirely rural are Kamabuye, Musenyi, Ngeruka and Shyara while there are other sectors that are more urbanized such as Rilima with 86.2% of urban area, Nyamata (79.9%), Mayange (64.8%) and Ntarama (59.4%).

b. Number of households and size of household

The results of 5th RPHC 2022 indicate the total of 137,777 households in Bugesera District. The average household size in Bugesera District is 3.9 persons per household. At the Sector level, the highest sizes are found in Ngeruka and Rweru Sector (4.2 persons/household each). The smallest household size is found in Ntarama sector (3.6persons/household each). The results of 5th RPHC 2022 revealed that nationally 28.9% of private households are headed by women. In Bugesera district, private households headed by females are 28.8%. At sector level, the highest percentages of households headed by women are found in Nyarugenge sector (33.3%), Kamabuye (31. 9%) and Ngeruka sector (31.6%) while the lowest are found in Ntarama sector (25.2%), Juru (25.7%) and Nyamata (25.9%).

Table 52: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ¹	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
Eastern Province	886,132	3,521,227	4.0	70.4	29.6
Bugesera District	137,777	541,539	3.9	71.2	28.8
Gashora	8,393	31,721	3.8	71.1	28.9
Juru	8,508	33,746	4.0	74.3	25.7
Kamabuye	5,917	24,437	4.1	68.1	31.9

Sectors	Total number of private households	Corresponding Population ¹	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Mareba	7,219	29,256	4.1	69.1	30.9
Mayange	13,321	50,697	3.8	70.4	29.6
Musenyi	9,975	40,241	4.0	70.2	29.8
Mwogo	7,846	30,162	3.8	72.7	27.3
Ngeruka	8,801	37,309	4.2	68.4	31.6
Ntarama	12,536	45,340	3.6	74.8	25.2
Nyamata	21,503	80,822	3.8	74.1	25.9
Nyarugenge	6,339	25,262	4.0	66.7	33.3
Rilima	7,207	29,223	4.1	71.5	28.5
Ruhuha	7,166	29,595	4.1	69.6	30.4
Rweru	8,953	37,872	4.2	69.5	30.5
Shyara	4,093	15,856	3.9	69.0	31.0

¹ This population does not include the resident population from Institutional Households

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

c. Education

In Bugesera district, the total population age 3 and above is 495,930. 17.6% of them has never attended any formal school, 58.5% attended the primary level, 9.5% attended lower secondary level, 7.3% has attended upper secondary and 3.4% attended university level. The level of educational attended varies across sectors, Juru has a highest percentage of primary school attended (67.9%), Nyamata is highest in upper secondary school attended (12.7%), and Nyamata has a high percentage of 9.1% of the population attended University than other sectors.

Table 53: Resident population of Bugesera District aged 3 Plus highest level of school attended by sector

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/cational	Lower secondary	Upper secondary	University	Not stated
Rwanda	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Bugesera District	495,930	100	17.6	3.0	58.5	0.7	9.5	7.3	3.4	0.0
Gashora	28,978	100	16.8	3.3	57.1	0.9	10.9	8.8	2.2	0.0
Juru	30,196	100	17.6	1.9	67.9	0.6	7.0	3.7	1.3	0.0
Kamabuye	21,976	100	20.3	2.7	60.2	0.7	9.9	4.9	1.2	0.1
Mareba	26,436	100	23.5	2.3	62.4	0.5	6.5	3.8	0.9	0.0
Mayange	49,028	100	13.0	4.3	52.4	0.8	11.9	12.1	5.5	0.0
Musenyi	36,814	100	19.5	2.1	64.7	0.8	8.0	4.0	0.9	0.0
Mwogo	26,752	100	19.4	2.3	65.3	0.6	7.7	3.8	0.9	0.0
Ngeruka	33,888	100	24.6	1.7	61.9	0.4	7.6	3.1	0.6	0.0
Ntarama	40,999	100	14.4	4.1	52.8	1.2	10.6	9.8	7.2	0.0
Nyamata	73,791	100	11.8	4.5	49.4	0.9	11.6	12.7	9.1	0.0
Nyarugenge	22,764	100	23.3	1.6	60.5	0.4	8.3	4.7	1.2	0.0

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOKA/ Vocational	Lower secondary	Upper secondary	University	Not stated
Rilima	29,677	100	15.6	3.1	58.4	0.5	11.0	8.9	2.4	0.0
Ruhuha	26,820	100	18.0	2.2	59.6	0.8	9.3	6.7	3.4	0.0
Rweru	33,498	100	20.7	2.2	61.8	0.4	8.7	5.1	1.1	0.0
Shyara	14,313	100	22.4	1.4	65.7	0.4	6.0	3.3	0.8	0.0

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

d. Means of livelihoods

In Bugesera district, Agricultural households occupy (66.4%) with 59.4% of households engaged in crop farming and 42.8% Households engaged in Livestock husbandry. At sector level, Ngeruka and Kamabuye sectors have a high proportion of Households engaged in crop farming (82.6% and 81.4% respectively), and Ngeruka has also a high proportion of households engaged in livestock husbandry (65.3%), followed by Shyara (61.3%).

It was also revealed that the employment to population ratio is 47.2 percent among people residing in Bugesera district, it is higher in urban areas of Bugesera (50.1 percent) than in rural areas (45.3 percent). It was observed that in district of Bugesera, the highest employment to population ratio among males stands at 71.1% and was observed in age group 30-34. On the other side the highest employment to population among females is 49.2% and was observed in the age group 40-44. The lowest employment to population ratio among males stands at 7.1% and was observed among males of the age group 85+, the lowest employment to population ratio among females is 3.6% and was observed among females in the same age group (85+).

Table 54: Distribution of household engaged in livestock husbandry in Bugesera District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,928	62.6	1,669,273	50.4
Eastern Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Bugesera district	137,777	91,469	66.4	81,884	59.4	58,917	42.8
Gashora	8,393	4,675	55.7	3,914	46.6	2,757	32.8
Juru	8,508	6,836	80.3	6,325	74.3	4,688	55.1
Kamabuye	5,917	5,049	85.3	4,817	81.4	3,287	55.6
Mareba	7,219	6,056	83.9	5,597	77.5	4,204	58.2
Mayange	13,321	8,378	62.9	7,279	54.6	5,093	38.2
Musenyi	9,975	7,888	79.1	7,148	71.7	5,207	52.2
Mwogo	7,846	5,338	68.0	4,758	60.6	3,165	40.3
Ngeruka	8,801	7,748	88.0	7,272	82.6	5,750	65.3
Ntarama	12,536	5,451	43.5	4,518	36.0	3,234	25.8
Nyamata	21,503	8,795	40.9	7,325	34.1	5,039	23.4
Nyarugenge	6,339	4,785	75.5	4,374	69.0	3,063	48.3
Rilima	7,207	4,741	65.8	4,117	57.1	3,084	42.8

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Ruhuha	7,166	5,457	76.2	5,088	71.0	3,537	49.4
Rweru	8,953	6,859	76.6	6,283	70.2	4,298	48.0
Shyara	4,093	3,413	83.4	3,069	75.0	2,511	61.3

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

In Bugesera district, both urban and rural areas, private households use mainly improved drinking source of water (87.8% in urban and 66.4% in rural). The percentage of private households using unimproved source of drinking water is higher in rural (33.6%) than in urban (12.2 %). More details are displayed in figure below: The figure below shows the main source of drinking water in each sector. It shows that in Rweru (67.6%), Kamabuye (62.2%), Juru (61.4%) and Mwogo (60.4%) the main source of drinking water is the unimproved drinking water source.

e. Health, water supply and sanitation facilities

In Bugesera District 92.7% are using Mutuelle as main health insurance, 4.1% using RSSB or RAMA, 0.7% using private insurance, 0.2% using school insurance, 0.2% using NGOs insurance and 2% using employer insurance.

In Bugesera district, 75.1% of private households use improved water sources. At the sector level, the percentages of the private households using water from improved sources are highest in Mayange (99.1%), Ruhuha (96.1%), Nyamata (95.0%), Gashora and Rilima (90.7% each) and Nyarugenge (90.3%) while the lowest are in Rweru (32.4%), Juru (38.6%) and Mwogo (39.6%).

In Bugesera district, both urban and rural areas, private households use mainly improved drinking source of water (87.8% in urban and 66.4% in rural). The percentage of private households using unimproved source of drinking water is higher in rural (33.6%) than in urban (12.2 %). More details are displayed in figure below: The figure below shows the main source of drinking water in each sector. It shows that in Rweru (67.6%), Kamabuye (62.2%), Juru (61.4%) and Mwogo (60.4%) the main source of drinking water is the unimproved drinking water source.

f. Housing characteristics

The results of 5th Population and Housing Census 2022 revealed that in the Eastern Province the predominant type of habitat is Umudugudu (planned rural settlement) with (86.5%). It is in same as in Bugesera district where it is 85.6%. In this district (Bugesera), this first type is followed by dispersed/isolated housing (5.4%) and spontaneous/squatter housing (4.2%).

The type of habitat varies across sectors: Umudugudu (planned rural settlement) is most prevalent in Nyarugenge (99.4%) and Gashora (98.9%) and low in Juru (46.1%). The sectors with the high percentages of dispersed/isolated housing units are Juru (24.6%) and Ntarama (15.8%). Juru has also the highest percentage of spontaneous/squatter housing (22%).

Table 55: Distribution of households by type of habitat

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
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Bugesera	137,777	100	85.6	1.0	1.6	5.4	1.7	4.2	0.6	0.0
Bugesera Urban	55,610	100	79.3	1.8	1.7	5.6	4.1	6.5	0.8	0.0
Bugesera Rural	82,167	100	89.8	0.4	1.5	5.3	0.1	2.6	0.4	0.0
Gashora	8,393	100	98.9	0.2	0.1	0.5	0.0	0.0	0.3	0.0
Juru	8,508	100	46.1	0.9	6.5	24.6	0.0	22.0	0.0	0.0
Kamabuye	5,917	100	96.4	0.2	1.1	1.2	0.9	0.0	0.2	0.0
Mareba	7,219	100	92.4	0.2	2.3	4.5	0.0	0.1	0.6	0.0
Mayange	13,321	100	94.5	2.2	1.3	1.6	0.1	0.3	0.2	0.0
Musenyi	9,975	100	89.5	0.1	0.5	6.7	0.0	2.6	0.5	0.0
Mwogo	7,846	100	97.1	1.2	0.2	1.1	0.0	0.3	0.0	0.0
Ngeruka	8,801	100	92.7	0.4	1.5	1.4	0.0	3.9	0.1	0.0
Ntarama	12,536	100	62.9	0.9	2.8	15.8	8.6	7.6	1.4	0.0
Nyamata	21,503	100	75.8	1.4	1.7	5.9	5.7	9.0	0.5	0.0
Nyarugenge	6,339	100	99.4	0.2	0.0	0.3	0.0	0.0	0.0	0.0
Rilima	7,207	100	90.6	0.4	3.5	2.6	0.0	2.1	0.8	0.0
Ruhuha	7,166	100	97.9	0.1	0.6	0.1	0.0	1.3	0.0	0.0
Rweru	8,953	100	92.5	3.9	0.3	0.6	0.0	0.5	2.1	0.0
Shyara	4,093	100	90.8	0.1	0.1	7.2	0.0	0.3	1.4	0.0

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

By area of residence, the predominant type of habitat in Bugesera district is the same in both urban and rural areas: it is Umudugudu (planned rural settlement) where it is 79.3% in urban areas and 89.8% in rural areas. The second type of habitat in urban areas is spontaneous/squatter housing (6.5%), followed by dispersed/isolated housing (5.6%) while in rural areas, the second type is dispersed/isolated housing (5.3%), followed by spontaneous/squatter housing (2.6%).

g. Appliance and assets ownership

At the district level, 81.5% of private households possess a radio, 67.5% a mobile phone, 16.2% a smartphone, 13.1% a TV and 4.0% a computer. The percentage of private households possessing a radio is high in Nyamata (90.3%), Mayange (88.9%) and Rilima (88.4%), it is low in Shyara (69.4%). The percentage of private households possessing a television is high in Nyamata (28.9%) and Ntarama (21.8%) while it is low in Ngeruka (3.3%), Shyara (4.2%), Kamabuye and Nyarugenge (4.4% each). Mobile phone is mostly possessed by private households of Nyamata (82.9%), Mayange (78.9%), Rilima (77.1%), Ntarama (75.8%) and Gashora (70.2%). The sectors with high percentage of households with smartphone are Nyamata (35.5%), Ntarama (26.97%) and Mayange (22.7%) while the percentage of households possessing this asset is low in Shyara (4.3%) and Ngeruka (5.1%). The computer is mostly possessed in Nyamata (11.9%) and Ntarama (9.4%).

Table 56: Percentage of private households 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
Eastern Province	886,132	80.3	9.3	76.5	16.4	2.1
Bugesera District	137,777	81.5	13.1	78.3	21.3	4.0
Gashora	8,393	82.9	8.8	80.9	21.6	2.2
Juru	8,508	80.7	6.4	76.9	9.8	0.9
Kamabuye	5,917	77.5	4.4	74.3	11.7	0.9
Mareba	7,219	73.9	5.8	69.3	10.9	1.2
Mayange	13,321	88.9	19.5	86.9	29.6	4.3
Musenyi	9,975	76.1	6.1	71.5	10.6	1.2
Mwogo	7,846	77.0	9.7	72.7	11.1	1.2
Ngeruka	8,801	76.2	3.3	71.5	8.9	0.6
Ntarama	12,536	84.9	21.8	82.4	31.9	9.4
Nyamata	21,503	90.3	28.9	88.2	41.8	11.9
Nyarugenge	6,339	71.7	4.4	67.3	10.9	0.9
Rilima	7,207	88.4	14.9	86.3	25.9	2.7
Ruhuha	7,166	80.4	11.8	76.8	21.1	2.9
Rweru	8,953	76.1	5.8	72.5	12.9	1.2
Shyara	4,093	69.4	4.2	57.3	5.6	0.8

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

h. Access to energy for lighting and cooking

In Bugesera district, the main source of energy for lighting used by households is electricity (60.8%). At the sector level, the percentage of households using electricity for lighting is high in Nyamata (79.3%) and Mayange (72.9%), and it is low in Mwogo (46.4%), Shyara (48%), Kamabuye (49%), Juru (49.1%) and Ngeruka (49.4%). The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Shyara (45%), Juru (43.1%), Mwogo (42.3%), Ngeruka (40.8%) and Kamabuye (40.3%). The sectors with the highest use of candles are Mwogo (7%) and Ntarama (5.8%).

According to the area of residence, the sources of energy for lighting in Bugesera district are mainly electricity, flashlight/phone flashlight and candles. However, the percentages of households using them vary by area of residence. In urban areas, the main source of energy for lighting is electricity (75.2%), followed by flashlight/phone flashlight (18.5%) and candles (3.8%). In rural areas, 51.1% of private households use electricity as main source of energy for lighting while 38.7% use flashlight, 3.8% use candles and 2.6% use firewood.

Table 57: Distribution of households of Bugesera District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraff	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable	Lantern	Other source of	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
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	1.8	0.5	0.0
Bugesera	137,777	100	60.8	0.3	0.0	3.8	2.0	1.5	30.5	0.1	0.6	0.4	0.0
Bugesera _Urban	55,610	100	75.2	0.2	0.0	3.8	1.0	0.6	18.5	0.1	0.4	0.3	0.0

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraff	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable	Lantern	Other source of	Not stated
Bugesera_Rural	82,167	100	51.1	0.3	0.0	3.8	2.6	2.1	38.7	0.1	0.7	0.5	0.0
Gashora	8,393	100	75.2	0.2	0.0	3.8	1.0	0.6	18.5	0.1	0.4	0.3	0.0
Juru	8,508	100	49.1	0.2	0.0	4.2	1.3	0.7	43.1	0.2	0.8	0.4	0.0
Kamabuye	5,917	100	49.0	0.2	0.0	2.7	4.8	1.9	40.3	0.1	0.9	0.1	0.0
Mareba	7,219	100	51.2	0.3	0.0	1.9	3.4	3.8	38.4	0.1	0.5	0.3	0.0
Mayange	13,321	100	72.9	0.3	0.0	4.1	0.7	0.7	20.4	0.1	0.6	0.2	0.0
Musenyi	9,975	100	53.4	0.2	0.0	3.1	2.2	4.4	35.2	0.1	0.7	0.7	0.0
Mwogo	7,846	100	46.4	0.1	0.0	7.0	1.1	1.9	42.3	0.1	0.7	0.5	0.0
Ngeruka	8,801	100	49.4	0.2	0.0	1.1	3.7	3.8	40.8	0.1	0.4	0.4	0.0
Ntarama	12,536	100	63.8	0.3	0.1	5.8	0.9	0.7	27.2	0.1	0.9	0.4	0.0
Nyamata	21,503	100	79.3	0.3	0.0	4.7	0.6	0.4	13.9	0.1	0.3	0.3	0.0
Nyarugenge	6,339	100	49.6	1.4	0.0	2.9	3.4	1.9	39.3	0.1	0.9	0.5	0.0
Rilima	7,207	100	65.8	0.2		4.6	2.4	0.6	25.3	0.1	0.7	0.3	0.0
Ruhuha	7,166	100	61.1	0.2	0.0	1.7	1.3	0.9	33.4	0.1	0.6	0.5	0.0
Rweru	8,953	100	59.3	0.1		2.4	2.6	2.5	31.9	0.3	0.5	0.5	0.0
Shyara	4,093	100	48.0	0.0	0.0	2.1	3.4	0.2	45.0	0.0	0.3	0.9	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 are firewood (77.4%) followed by charcoal (16.7%) and gas (3.9%). At the sector level, firewood is the most used source of cooking energy by private households in Ngeruka (97.1%), Kamabuye (96.3%), Mareba (95.6%), Rweru and Juru (94.2% each), Musenyi (92.7%) and Nyarugenge (91.2%). (23.6%). Sectors with the highest percentages of private households using gas as main source of cooking energy are also Nyamata (12.2%), Ntarama (8.8%) and Mayange (4.5%).

The main sources of energy for cooking used by private households in Bugesera district vary by area of residence. In Rural areas, private households use mostly firewood at a very high percentage (91.7%) and charcoal (5.8%). In urban areas, private households use most Firewoods (56.2%), charcoal (32.8%) and gas (8.5%).

i. Vulnerability

In Bugesera district the vulnerability prevalence rate is 3.6%. At sector level, the highest prevalence rate of the resident population with vulnerability is in Gashora (5.3%) and while the lowest is in Juru and Ruhuha (2.7% each).

Table 58: Persons with vulnerability of Bugesera District by Sector of residence and sex

Sectors of residence	Total resident population	Person's with vulnerability			Prevalence of vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Bugesera district	471,070	17,019	7,668	9,351	3.6
Gashora	27,610	1,458	646	812	5.3
Juru	28,910	773	370	403	2.7
Kamabuye	20,997	884	363	521	4.2
Mareba	24,861	1,010	458	552	4.1

Sectors of residence	Total resident population	Person's with vulnerability			Prevalence of vulnerability
	Both sexes	Both sexes	Male	Female	Both sexes
Mayange	46,300	1,460	646	814	3.2
Musenyi	34,738	1,287	572	715	3.7
Mwogo	25,576	964	437	527	3.8
Ngeruka	31,848	1,276	568	708	4
Ntarama	38,777	1,099	515	584	2.8
Nyamata	69,714	2,162	893	1,269	3.1
Nyarugenge	21,774	793	311	482	3.6
Rilima	28,532	1,104	673	431	3.9
Ruhuha	25,759	704	296	408	2.7
Rweru	32,028	1,445	653	792	4.5
Shyara	13,646	600	267	333	4.4

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

4.8. Rwamagana District

4.8.1. Physical environment

a. Location

Rwamagana District is one of the seven Districts of the Eastern Province. It is bordered by Gicumbi and Gatsibo Districts in the North, Kayonza District in the East, Bugesera and Ngoma Districts in the South, Kicukiro and Gasabo Districts in the West. It is composed of 14 Sectors with a total surface area of 691.9 km².

b. Topography

The topography of the District of Rwamagana is characterized, in general, by lowly undulating hills separated by valleys, some of which are swampy and boggy. It is located in what is called "eastern plateau" and is between 1400-1700 m a.s.l. The district is classified as a medium altitude District which lies at about 1° 57' 9" South, 30° 26' 16" East. The highest point is Mount Nyirafumbwe at 1825 m in Fumbwe Sector, North-East of the District. Most of the soils are loamy and few others are sandy with loam mixture. Clay soils are found in some boggy areas.

c. Climate and Rainfall

The climate is a moderate tropical climate with four seasons (two dry and two wet seasons), with a tendency to aridity. The rainfall increases during the months of April-May and October-December of every year. Average annual precipitation is 1000mm while the average temperature ranges between 19o C and 30o C with the minimum of 13oC and maximum of 30o C sometimes exceeding, and less variability throughout the year.

d. Geology and Soils

The geology of the district is characterized by a combination of Precambrian bedrock and more recent geological formations. The district lies within the Central Plateau of Rwanda, which is primarily composed of metamorphic rocks such as schists, quartzites, and gneisses. These rocks have undergone significant metamorphism, resulting in complex structures and varying mineral compositions. Additionally, the area features some intrusive igneous rocks like granites and pegmatites, which contribute to the geological diversity of the region.

e. Hydrography

The hydrographic network of the District of Rwamagana belongs to the river Akagera basin, the main tributary of Lake Victoria. The district has Lake MUGESERA in the South and Lake Muhazi in the North, two rivers

Sumo and Nyabarongo and accounts for some marshes gorged with water namely: Cyaruhogo, Bigezi, Kavura, Rwarugaju, Nyabarongo, Mutukura, Ruhita, Cyimpima, Rwandenzi, Sumo which constitute a significant potential for rice growing and horticultural production. The main water body in Rwamagana District is Lake Muhazi shared with Kayonza, Gicumbi, Gatsibo and Gasabo Districts. Lake Muhazi regulates the upstream part of the Nyabugogo catchment with a catchment of 872 km². This District is subdivided into 2 level one catchments namely Nyabarongo lower and Akagera upper catchments.

4.8.2. Ecological characteristics

Rwamagana District has a diverse ecological composition, with a mix of savannah, wetland, and agricultural ecosystems. While much of the district has been altered by human activity, its wetlands and remaining patches of natural vegetation continue to support a variety of wildlife and plant species. Conservation efforts are essential to protect the remaining biodiversity, especially wetland ecosystems that host important bird species and provide ecosystem services.

a) Flora

The vegetation of the district is composed of both natural and artificial plant species, including remnants of natural forests, savannah vegetation, and cultivated plantations. Previously the district was once covered with natural savannah and woodland vegetation, but much of it has been altered due to agriculture and human settlements. However, some patches of natural vegetation still exist in wetlands and protected areas. The dominant species include: **(i) Savannah Woodland Species such as** *Acacia seyal* (Red Acacia), *Acacia hockii* (Hock's Acacia), *Ficus thonningii* (Strangler Fig), *Albizia gummifera* (Peacock Flower Tree), *Erythrina abyssinica* (Red Hot Poker Tree), *Balanites aegyptiaca* (Desert Date); **(ii) Wetland Vegetation** such as *Cyperus papyrus* (Papyrus), *Typha domingensis* (Cattail), *Phragmites mauritianus* (Reed Grass), *Echinochloa pyramidalis* (Antelope Grass) etc.

For the dominant cultivated plants and agroforestry for fuelwood, and soil conservation include **(i) Agricultural Crops** such as *Zea mays* (Maize), *Sorghum bicolor* (Sorghum), *Phaseolus vulgaris* (Common Bean), *Manihot esculenta* (Cassava), *Oryza sativa* (Rice) – grown in marshlands, *Coffea arabica* (Arabica Coffee), *Musa spp.* (Banana varieties), *Arachis hypogaea* (Groundnuts), **(ii) Fruit Trees** such as *Mangifera indica* (Mango), *Persea americana* (Avocado), *Carica papaya* (Papaya), *Citrus sinensis* (Orange), *Psidium guajava* (Guava), **(iii) Planted Trees** for agroforestry and reforestation such as *Eucalyptus spp.* (Eucalyptus species, mainly used for firewood and construction), *Pinus patula* (Patula Pine), *Grevillea robusta* (Silky Oak), *Calliandra calothyrsus* (Calliandra, used for nitrogen fixation).

b) Fauna

The district's fauna includes various mammals, birds, reptiles, amphibians, and insects, primarily found in wetlands, forests, and agricultural fields.

- Mammals

Though large wildlife is rare due to habitat loss, smaller mammals can still be found in some areas. These include **(i) Rodents and Small Mammals** such as *Rattus rattus* (Black Rat), *Cricetomys gambianus* (Giant Pouched Rat), *Atherurus africanus* (African Brush-tailed Porcupine), *Thryonomys swinderianus* (Greater Cane Rat); **(ii) Primates** (found in patches of forests and near lakes), *Chlorocebus aethiops* (Vervet Monkey), *Papio anubis* (Olive Baboon); **(iii) Carnivores and Small Predators** such as *Genetta genetta* (Common Genet), *Mellivora capensis* (Honey Badger)

- Birds

Wetlands and forests provide suitable habitats for a variety of bird species. Some important bird species found in Rwamagana include: **(i) Wetland and Water Birds** such as *Ardea cinerea* (Grey Heron), *Egretta garzetta* (Little Egret), *Anastomus lamelligerus* (African Openbill Stork), *Balearica regulorum* (Grey Crowned Crane) – Rwanda's national bird, **(ii) Savannah and Forest Birds** such as *Halcyon malimbica* (Blue-breasted Kingfisher), *Tockus erythrorhynchus* (Red-billed Hornbill), *Ploceus cucullatus* (Village Weaver), *Terpsiphone*

viridis (African Paradise Flycatcher), (iii) Birds of Prey such as *Buteo buteo* (Common Buzzard), *Milvus migrans* (Black Kite).

- Reptiles and amphibians

Due to the presence of wetlands and water bodies, the district harbors a variety of amphibians and reptiles.

(i) Reptiles such as *Naja melanoleuca* (Forest Cobra), *Python sebae* (African Rock Python), *Varanus niloticus* (Nile Monitor Lizard), (ii) Amphibians such as *Xenopus laevis* (African Clawed Frog), *Hemisus marmoratus* (Marbled Snout-burrower).

- Insects and pollinators

Insects play a crucial role in the district's ecology, particularly for pollination and maintaining ecosystem balance. Some of them found in Rwamagana district include (i) Pollinators such as *Apis mellifera* (African Honeybee), *Xylocopa spp.* (Carpenter Bees), *Danaus chrysippus* (African Monarch Butterfly) (ii) Pests and Agricultural Insects such as *Spodoptera exempta* (African Armyworm), *Locusta migratoria* (Migratory Locust)

4.8.3. Socio-economic characteristics

a. Population

The 5th Rwanda Population and Housing Census (PHC5) has enumerated 484,953 residents, representing approximately 13.6% of the total population in the Eastern Province. In terms of gender distribution, the population of Rwamagana District is predominantly male, with 243,794 males comprising 50.3% of the total population. Table 1.2, presented below, provides detailed information on the population of Rwamagana district at sector level by sex. Females outnumber males in sectors such as Munyaga (52.9%), Fumbwe (52.6%), Munyiginya (52.5%), Rubona (52.4%), and Musha (52%). On the other hand, the share of females in Muhazi is 34.3%. Furthermore, the table reveals the top two most populated sectors in Rwamagana District, are Muyumbu (56,881) and Muhazi (53,482). Conversely, the less populated sectors are Nzige (19,285) and Munyaga (20,812).

Table 59: Population of Rwamagana District by Sector and sex in 2022

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	-
Eastern Province	3,563,145	1,734,394	1,828,751	100	48.7	51.3	-
Rwamagana District	484,953	243,794	241,159	100	50.3	49.7	100
Fumbwe	33,074	15,678	17,396	100	47.4	52.6	6.8
Gahengeri	35,732	17,391	18,341	100	48.7	51.3	7.4
Gishali	36,692	18,405	18,287	100	50.2	49.8	7.6
Karenge	28,525	13,828	14,697	100	48.5	51.5	5.9
Kigabiro	47,358	23,159	24,199	100	48.9	51.1	9.8
Muhazi	53,482	35,163	18,319	100	65.7	34.3	11
Munyaga	20,812	9,803	11,009	100	47.1	52.9	4.3
Munyiginya	24,197	11,497	12,700	100	47.5	52.5	5
Musha	27,525	13,209	14,316	100	48	52	5.7
Muyumbu	56,881	27,582	29,299	100	48.5	51.5	11.7
Mwulire	33,936	16,342	17,594	100	48.2	51.8	7
Nyakaliro	37,538	18,145	19,393	100	48.3	51.7	7.7

District and Sector	Frequency			Percent			Share of the population
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Nzige	19,285	9,341	9,944	100	48.4	51.6	4
Rubona	29,916	14,251	15,665	100	47.6	52.4	6.2

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

Rwamagana District population lives predominantly in rural area (62.9%) while resident population in urban represents 37.1%. The sectors of Rwamagana District which are entirely rural are Munyaga, Nzige and Rubona sector while the following sectors have a high percentage of urbanization: Kigabiro (72.6%), Muyumbu (65.3%) and Muhazi (61.9%).

b. Number of households and size of household

The results of 5th RPHC 2022 indicate that in Rwamagana District alone, there are 121,051 private households. On average, each household in the Rwamagana District consists of 3.8 individuals. When examining the household sizes at the sector level, the highest average sizes were observed in Musha, where households contain an average of 4 persons each. Conversely, the smallest household sizes were found in Kigabiro, with an average of 3.6 individuals per household.

Table 60: Number of households and their corresponding population, mean size and sex of household head

Sectors	Total number of private households	Corresponding Population ⁸	Household Size	Percentage	
				Male Headed HHs	Female Headed HHs
Rwanda	3,312,743	13,100,600	4.0	71.1	28.9
Eastern Province	886,132	3,521,227	4.0	70.4	29.6
Rwamagana District	121,051	462,060	3.8	69.7	30.3
Fumbwe	8,389	33,041	3.9	69.9	30.1
Gahengeri	9,119	35,706	3.9	70.7	29.3
Gishali	8,933	33,761	3.8	66.6	33.4
Karenge	7,518	28,434	3.8	73.7	26.3
Kigabiro	13,059	46,738	3.6	69.7	30.3
Muhazi	8,999	34,596	3.8	64.4	35.6
Munyaga	5,570	20,800	3.7	64.4	35.6
Munyiginya	6,263	24,135	3.9	66.1	33.9
Musha	6,906	27,427	4.0	68.1	31.9
Muyumbu	15,020	56,853	3.8	75.2	24.8
Mwulire	8,700	33,913	3.9	69.7	30.3
Nyakaliro	9,677	37,527	3.9	74.1	25.9
Nzige	5,033	19,242	3.8	70.0	30.0
Rubona	7,865	29,887	3.8	66.6	33.4

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

c. Housing characteristics

The findings from the 5th Population and Housing Census of 2022 reveal that in the Eastern Province, the predominant type of habitat is Umudugudu, which refers to planned rural settlements, accounting for 86.5%

of the housing structures. This percentage is quite similar to the situation in Rwamagana District, which is one of the Districts within the Eastern Province, where 82.8% of the housing structures also fall under the category of Umudugudu, followed by dispersed/ isolated housing with 10.9%. The type of habitat varies across sectors. Umudugudu/Planned rural settlement is most prevalent in Gishari (96.4%) and Munyaga (94.6%) and low in Nyakaliro (59.1%). The sectors with the high percentages of dispersed/isolated housing units are Gahengeri (26.1%), Nyakaliro (23.5%) and Fumbwe (20.3%). The table below displays results by sector.

Table 61: Distribution of households in Rwamagana District by type of habitat

Sectors	Total Number of Households	Percentage								
		Total	Umudugudu/Planned rural settlement	Integrated model	Old settlement	Dispersed/Isolated	Modern planned	Spontaneous/squatter	Other type of	Not stated
Rwanda	3,312,743	100	65.4	0.8	2.3	14.9	6.9	8.9	0.8	0.0
Eastern Province	886,132	100	86.5	0.5	2.2	7.4	0.7	2.0	0.6	0.0
Rwamagana	121,051	100	82.8	0.7	0.9	10.9	1.9	2.3	0.5	0.0
Rwamagana-Urban	41,920	100	83.6	0.8	0.7	5.1	5.2	4.1	0.5	0.0
Rwamagana-Rural	79,131	100	82.3	0.6	1.1	14.0	0.1	1.4	0.5	0.0
Fumbwe	8,389	100	78.0	0.5	0.5	20.3	0.3	0.5	0.0	0.0
Gahengeri	9,119	100	67.9	0.4	0.7	26.1	0.0	3.8	0.9	0.0
Gishali	8,933	100	96.4	0.4	0.4	2.6	0.0	0.1	0.1	0.0
Karenge	7,518	100	89.9	2.6	1.4	5.9	0.1	0.1	0.1	-
Kigabiro	13,059	100	89.4	0.3	0.3	1.9	4.4	3.5	0.1	0.0
Muhazi	8,999	100	89.1	2.8	0.3	3.7	0.5	3.2	0.3	0.0
Munyaga	5,570	100	94.6	0.3	0.4	4.6	-	0.0	0.0	-
Munyiginya	6,263	100	89.2	0.5	0.3	9.8	0.1	0.1	0.1	-
Musha	6,906	100	76.6	0.1	1.2	18.2	0.0	0.8	3.0	-
Muyumbu	15,020	100	73.4	0.6	1.7	12.5	7.7	3.5	0.5	0.0
Mwulire	8,700	100	90.3	0.1	0.1	7.5	0.3	1.3	0.5	0.0
Nyakaliro	9,677	100	59.1	0.6	3.7	23.5	4.3	8.5	0.4	0.0
Nzige	5,033	100	89.7	0.1	0.7	8.3	0.1	0.3	0.8	0.0
Rubona	7,865	100	90.7	0.2	0.9	6.1	-	1.6	0.5	0.0

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

By area of residence, it is evident that the predominant type is planned rural settlement. This holds true for both urban areas, where planned rural settlements account for 83.6% of the habitat types, and rural areas, where the distribution remains consistent at 82.3%.

d. Education

In Rwamagana District, 15.6% of the population has never attended school, while 2.9% have attended nursery, and 59.1% have attended primary school. Other education levels include 0.8% for INGOBOKA/Vocational, 10.5% for lower secondary, 7.8% for upper secondary, 3.3% for university, and 0.0% is not stated. The distribution of the highest level of education attended varies among sectors, with differences in the percentage of individuals at each education level. For example, Munyaga has a higher percentage (20.4%) of individuals who have never attended school compared to other sectors, while Nzige has a higher percentage (65.7%) of individuals attended primary school, Karenge and Muyumbu(1.1% each) have higher percentages of individuals who have attended Ingoboka/vocational school, Kigabiro has a higher percentage of individuals who have attended low secondary school(12.2%) and university level(6.4%) while Gishari (13.3%) has a high percentage of individuals who have attended upper secondary school. Each sector has its own unique distribution of educational levels attended by the population.

Table 62: Resident population of Rwamagana District aged 3 Plus highest level of school attended

Sectors	Count	Percentage								
	Total(counts)	Total	Never attended school	Nursery	Primary	INGOBOK A/Vocation	Lower secondary	Upper secondary	University	Not stated
Rwanda	11,999,691	100	16.7	2.7	59.5	0.8	9.6	7.1	3.6	0.0
Eastern Province	3,215,103	100	18.1	2.9	60.9	0.6	9.3	6.0	2.2	0.0
Rwamagana District	442,056	100	15.6	2.9	59.1	0.8	10.5	7.8	3.3	0.0
Fumbwe	29,796	100	17.6	2.7	58.9	0.8	9.2	7.4	3.3	0.0
Gahengeri	32,355	100	16.9	2.7	62.3	0.9	9.3	6.2	1.6	0.0
Gishali	33,565	100	15.7	2.7	52.2	0.8	10.5	13.2	4.9	0.0
Karenge	25,880	100	12.4	2.2	62.5	1.1	11.9	7.2	2.6	0.0
Kigabiro	43,252	100	12.4	3.8	52.9	0.8	12.2	11.4	6.4	0.0
Muhazi	50,529	100	19.1	1.9	54.9	0.8	11.1	8.7	3.6	0.0
Munyaga	18,966	100	20.4	2.8	62.9	0.5	8.0	3.8	1.7	0.0
Munyiginya	21,976	100	16.6	3.5	61.9	0.6	9.9	5.6	2.0	0.0
Musha	25,339	100	18.2	2.1	62.4	0.8	9.8	5.2	1.5	0.0
Muyumbu	50,921	100	11.6	4.1	57.9	1.1	11.5	8.9	4.9	0.0
Mwulire	30,865	100	16.3	3.8	59.0	0.7	10.3	7.4	2.3	0.0
Nyakaliro	33,803	100	10.8	3.8	62.9	0.7	11.1	7.5	3.1	0.0
Nzige	17,640	100	15.0	1.9	65.7	0.9	9.8	4.9	1.8	0.0
Rubona	27,169	100	19.3	1.5	64.1	0.7	8.8	4.4	1.3	0.0

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

e. Means of livelihoods

In Rwamagana district, agricultural households make up 65.8% of the total, with 58.9% of households engaged in crop farming and 43.5% involved in livestock husbandry. Among the sectors within Rwamagana district, Kigabiro and Muyumbu have a lower number of households engaged in crop farming and livestock husbandry (less than 50%) compared to other sectors (44.2% and 48.2% respectively). Households engaged in crop farming are more represented in Munyaga (77.1%) and Musha (76.3%) while those engaged in livestock husbandry are in Nzige (60.6%) and Munyaga (56.3%).

In Rwamagana, the employment to population ratio stood 50.7% of residents aged 16 and above while for males stood at 58.7% and 43.7% for females. In urban, the employment rate is 54.4% for both sexes where it 64.7% for males and 45.3% for females while in rural, it is 48.7% for both sexes and it is 55.5% for males and 42.8% for females. The employment to population ratio among males as well as females increases from age group 16-19 to 35-39 and starts decreasing from age group 40-44 to 85 years and above as people starts getting very older and retire. It was observed that in district of Rwamagana, the highest employment to population ratio among males stands at 72.9% and was observed in age group 30-34, On the other side the highest employment to population among females is 54.8% and was observed in the age group 35-39. The lowest employment to population ratio among males and females stands at 9.9% and 5.7% respectively in the age group 85+.

Table 63: Distribution of household engaged in livestock husbandry in Rwamagana District

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Rwanda	3,312,743	2,280,854	68.9	2,074,928	62.6	1,669,273	50.4

Sector	Agricultural households			Households engaged in crop farming		Households engaged in Livestock husbandry	
	Total Private Households	Counts	%	Counts	%	Counts	%
Eastern Province	886,132	638,806	72.1	582,139	65.7	417,831	47.2
Rwamagana District	121,051	79,624	65.8	71,246	58.9	52,688	43.5
Fumbwe	41,920	5,722	68.2	5,161	61.5	4,031	48.1
Gahengeri	79,131	6,924	75.9	6,387	70.0	4,734	51.9
Gishali	8,389	6,392	71.6	5,852	65.5	4,013	44.9
Karenge	9,119	5,762	76.6	5,185	69.0	4,130	54.9
Kigabiro	8,933	5,765	44.2	4,917	37.7	3,150	24.1
Muhazi	7,518	5,751	63.9	5,147	57.2	3,660	40.7
Munyaga	13,059	4,594	82.5	4,297	77.1	3,138	56.3
Munyiginya	8,999	4,618	73.7	4,229	67.5	3,151	50.3
Musha	5,570	5,557	80.5	5,269	76.3	3,720	53.9
Muyumbu	6,263	7,235	48.2	6,063	40.4	4,539	30.2
Mwulire	6,906	5,645	64.9	4,977	57.2	3,566	41.0
Nyakaliro	15,020	5,599	57.9	4,919	50.8	3,595	37.1
Nzige	8,700	4,029	80.1	3,555	70.6	3,048	60.6
Rubona	9,677	6,031	76.7	5,288	67.2	4,213	53.6

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

f. Appliance and assets ownership

At the District level, the census results show that a significant percentage of private households possess various electronic devices. Specifically, 84.5% of private households possess a radio, 81.1% have a mobile phone, 22.7% own a smartphone, 15.1% possess a TV, and 3.2% have a computer. When looking at the distribution within the sectors, the percentage of private households possessing a radio is highest in Muyumbu (89.9%), Kigabiro (89.2%), and Nyakaliro (88.8%). On the other hand, the lowest percentage is observed in Munyaga (72.9%). The percentage of private households possessing a television is high in Kigabiro (24.4%), while the lowest percentage is in Munyaga (4.9%). Mobile phones are widely possessed by private households in Muyumbu (87.6%) and Kigabiro (86.5%). The sectors with high percentage of households with smartphone are Kigabiro (36.7%), Muhazi (29.5%) and Muyumbu (29.4%) while the percentage of households possessing this asset is low in Munyaga (9.4%). The computer is mostly possessed in Kigabiro (6.4%) and Muyumbu (5.5%).

Table 64: Percentage of private households and of Rwamagana District possessing electrical appliance

Sectors and area of residence	Total Number of Private Household	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone ¹⁰	Smart Mobile	Computer
Rwanda	3,312,743	81.5	12.3	78.1	20.8	4.2
Eastern Province	886,132	80.3	9.3	76.5	16.4	2.1
Rwamagana District	121,051	84.5	15.1	81.1	22.5	3.2
Fumbwe	8,389	84.1	16.3	81.4	23.3	3.2
Gahengeri	9,119	82.2	10.5	78.7	17.7	1.9
Gishali	8,933	83.4	12.0	80.5	22.6	3.4

Sectors and area of residence	Total Number of Private Household	% of HHs owning the specified communication asserts				
		Radio	Television	Mobile phone10	Smart Mobile	Computer
Karenge	7,518	87.5	14.2	83.5	18.9	2.1
Kigabiro	13,059	89.2	24.4	86.5	36.7	6.4
Muhazi	8,999	86.6	18.5	83.9	29.5	3.7
Munyaga	5,570	72.9	4.9	69.2	9.4	0.7
Munyiginya	6,263	82.0	8.5	78.2	15.6	1.8
Musha	6,906	79.8	10.6	75.8	16.1	1.7
Muyumbu	15,020	89.9	22.1	87.6	29.4	5.5
Mwulire	8,700	83.6	14.0	79.8	21.8	2.6
Nyakaliro	9,677	88.8	19.5	85.0	23.9	3.4
Nzige	5,033	81.3	8.3	77.4	13.0	0.9
Rubona	7,865	77.1	7.5	72.2	10.6	0.9

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

g. Access to energy for lighting and cooking

In Rwamagana District, the main source of energy for lighting used by households are electricity (67.6%), flashlight/phone flashlight (24.2%) and candles (4.6%). At the sector level, the percentages of households using electricity for lighting are high in Kigabiro with 79.7%, Muyumbu with 75.9%, Muhazi and Karenge with 74.2% each, and Nyakaliro with 71.6%. The sectors with the high percentages of private households using flashlight/phone flashlight for lighting are Rubona (39.3%) and Musha (37.1%) while the sector with the high percentage of private households using candles is Muyumbu (6.7%).

Based on the area of residence, the main source of energy for lighting differs between rural and urban areas. In rural areas, the primary source of energy for lighting is electricity, accounting for 60% of households. This is followed by flashlight/phone flashlight usage at 31.2%, and candles at 4.2%. In contrast, in urban areas, a larger proportion of households, specifically 81.9%, rely on electricity as their main source of energy for lighting. Only a smaller percentage, 11.1%, use flashlight/phone flashlight for lighting purposes and 5.1% of private households use candles.

Table 65: Distribution of households of Rwamagana District by main source of energy for lighting

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable Battery	Lantern	Other source of energy	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
Eastern Province	886,132	100	57.6	0.6	0.0	3.1	1.4	1.7	33.2	0.2	1.8	0.5	0.0
Rwamagana	121,051	100	67.6	0.4	0.0	4.6	0.8	0.8	24.2	0.1	0.9	0.5	0.0
Rwamagana-Urban	41,920	100	81.9	0.4	0.0	5.1	0.3	0.2	11.1	0.1	0.5	0.2	0.0
Rwamagana-Rural	79,131	100	60.0	0.5	0.0	4.2	1.0	1.2	31.2	0.1	1.1	0.6	0.0
Fumbwe	8,389	100	64.9	0.2	0.0	4.6	0.7	1.5	27.4	0.1	0.3	0.4	0.0
Gahengeri	9,119	100	60.4	0.4	-	5.0	0.7	0.2	31.8	0.1	0.7	0.8	0.0
Gishali	8,933	100	67.7	0.5	-	5.2	0.9	1.2	21.9	0.1	1.6	0.8	0.0
Karenge	7,518	100	72.4	0.3	-	3.1	0.7	1.2	21.3	0.1	0.5	0.4	-
Kigabiro	13,059	100	79.7	0.5	0.1	4.8	0.6	0.1	13.0	0.2	0.9	0.2	0.0
Muhazi	8,999	100	72.4	0.7	-	4.6	0.6	1.3	18.5	0.1	0.8	0.9	0.0

Sector and area of residence	Total number of private households	Total	Electricity	Kerosene/Paraffin	Biogas	Candles	Firewood	Batteries/Bulb	Flashlight/Phone Flashlight	Rechargeable battery	Lantern	Other source of electricity	Not stated
Munyaga	5,570	100	63.9	0.5	0.0	3.8	1.4	1.4	27.8	0.1	1.0	0.3	-
Munyiginya	6,263	100	63.3	0.2	0.0	4.2	1.0	1.9	28.0	0.1	0.9	0.4	-
Musha	6,906	100	55.8	0.5	-	3.8	0.9	1.3	37.1	0.1	0.3	0.4	-
Muyumbu	15,020	100	75.9	0.5	0.0	6.7	0.5	0.1	15.2	0.1	0.8	0.2	0.0
Mwulire	8,700	100	66.4	0.4	0.0	3.7	0.8	0.9	26.7	0.1	0.6	0.4	-
Nyakaliro	9,677	100	71.6	0.4	-	4.6	0.9	0.9	19.6	0.2	1.4	0.3	0.0
Nzige	5,033	100	56.2	0.6	-	3.3	1.2	0.8	35.4	0.0	1.5	1.0	-
Rubona	7,865	100	53.1	0.3	-	3.4	1.2	0.5	39.3	0.2	1.3	0.8	0.0

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

h. Vulnerability

In Rwamagana District, the prevalence rate of vulnerability is slightly lower at 3.1%. When examining the sector-level data, it is observed that certain sectors have higher prevalence rates of Vulnerability among the resident population aged 5 years and above. Munyaga sector records the highest prevalence rate at 5.2%, followed by Munyiginya sector at 4.6%. On the other hand, Nyakaliro, Rubona and Karengwe sector report the lowest prevalence rate at 2.1%, 2.3% and 2.4% respectively.

Table 66: Persons with vulnerability of Rwamagana District by Sector of residence and sex

Sectors of residence	Total resident population age 5 years and above	Person's age 5 years and above with disability			Prevalence of disability
	Both sexes	Both sexes	Male	Female	Both sexes
Rwanda	11,537,934	391,775	174,949	216,826	3.4
Eastern Province	3,078,652	109,405	49,824	59,581	3.6
Rwamagana District	423,337	13,003	6,050	6,953	3.1
Fumbwe	28,519	1,064	451	613	3.7
Gahengeri	30,857	1,052	482	570	3.4
Gishali	32,198	994	446	548	3.1
Karengwe	24,959	601	259	342	2.4
Kigabiro	41,222	1,089	452	637	2.6
Muhazi	49,014	1,387	1,027	360	2.8
Munyaga	18,246	957	387	570	5.2
Munyiginya	21,125	968	421	547	4.6
Musha	24,209	908	389	519	3.8
Muyumbu	48,260	1,221	520	701	2.5
Mwulire	29,310	846	383	463	2.9
Nyakaliro	32,401	677	305	372	2.1
Nzige	16,965	640	262	378	3.8
Rubona	26,052	599	266	333	2.3

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

5. PUBLIC CONSULTATION AND PARTICIPATION

5.1 Overview

Public consultation and stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement is an on-going process that involves the following elements; stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism and on-going reporting to affected communities.

5.2 Purpose

- To prepare communities on potential impacts that could be caused by the project and can affect the community.
- 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.
- To ensure effective engagement with local communities and other key stakeholders throughout all phases of the project.
- 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.

5.3 Public participation – methods and process

In compliance with National regulations and international standards, Stakeholder engagement was the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement involved varying degrees, and the following elements were considered: stakeholder analysis and planning, disclosure and dissemination of information, consultation with stakeholders and participation, grievance mechanism, and ongoing reporting to beneficiaries or project Affected Persons.

The combination of both structured and unstructured interviews was used to consult different actors and stakeholders. From the scoping exercise, stakeholders were identified in three categories. (1) First category include project implementing entities, 2) Secondary category of Regulatory agencies, Government Institutions and local authorities, (3) Third category of Potential project beneficiaries. During the Public consultation, the consultant applied different participatory methods, namely; interviews, one-to-one discussions and community meeting and official meetings with stakeholders. Stakeholders meeting was informed on the proposed project and by using the key guiding questionnaires the consultant guided discussions and obtain relevant information on the likely impacts of the project activities. The next table summarizes categories of consulted stakeholders.

Discussions with decision making bodies, key stakeholders, sector institutions and specialist experts were made on the very concepts and nature of the proposed project, giving emphasis on levels of public participation, role of key stakeholders and joint contributions of these actors to the success of the project. In addition, the scope of the proposed project and possible means of maximizing local communities' social, economic and environmental benefits from the project implementation were underlined. The project is designed as an EPC and affected people have not yet identified for consultation. Thus the consultant consulted sampled members of communities living in different areas where the project will be implemented. Key stakeholders and authorities with whom consultations made at the project study areas were:

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. 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.

Table 67: Categories of consulted stakeholders at institutional level

Category	Institution/desired person	Relevance to the project	Issue to discuss
National regulatory and standards authorities	Rwanda Environment Management Authority (REMA)	REMA ensures the environmental sustainability of the project. Their role is critical to assess and mitigate environmental impacts, protect biodiversity, and enforce environmental laws to prevent degradation of ecosystems.	Environmental and social requirements for the project implementation
	Ministry of Environment (MoE)	The ministry sets overarching environmental policies and strategies. Their involvement ensures that the present project aligns with national environmental goals, such as water conservation, climate resilience, and sustainable land use.	Environment requirements related to the project implementation.
	Rwanda Land use and Management Authority	The authority ensures that the present project aligns with national land use plans. It prevents conflicts with existing land uses and ensure that the project supports proper land management and does not infringe on protected or restricted areas.	Land ownership and resettlement impacts.
	Rwanda Development Board	RDB is responsible for investment promotion and economic development. However, the EIA process was transferred to the authority / One Stop Center- EIA department to fast tracking investments and project certification process.	This ESIA process and project clearance
Local government institutions	REG branch managers in each district	Engineer provides local expertise in terms of electricity supply and availability Their involvement ensures that the project addresses the specific needs of locals	Crop selection, farming practices
	District environment officers	The district environment officers ensure that the project complies with local environmental regulations and that any potential negative impacts are mitigated at the district level.	Environmental and social monitoring at local level
	Sector Land manger	At the sector level, the land manager oversees land use and can facilitate coordination between the project	Land registration, valuation and land ownership

Category	Institution/desired person	Relevance to the project	Issue to discuss
		and local landholders, ensuring efficient project implementation and legally compliant.	
	Local community	Sampled community members and people living where the project will be implemented local people are the primary beneficiaries of the project .	Information on the proposed project including scope, coverage, activities and potential environmental and Social impacts; Project appreciation, project proposed mitigation measures, project sustainability, etc.

5.4 Consultation held during the preparation of this ESIA

5.3.1. Consultation with technical, regulator and official at central and local level

In addition to the public consultation meeting, the consultant team conducted one to one interview with different official to discuss the projects and collect their views, concern and recommendation. Consultation conducted also allowed the team to collect different data and information related to the projects like existing laws, standards and policies helped. Below are the key stakeholders consulted.

- Ministry of infrastructure: Environmental and Social Safeguards Specialist for World Bank Funded Projects;
- Ministry of Environment, Environment and Climate Change Experts& Land administration and Management
- Rwanda Environment Management Authority (REMA): In charge of pollution control and in charge of environmental monitoring
- Rwanda Development Board RDB: Environmental Review Specialist.
- EDCL: Project team involved in ESIA and feasibility study for substation upgrade project
- District land officers, District Environmental officers and Districts natural resources offices/directors.

• Key issues identified during consultations include:

- Site to store replaced electrical equipment during rehabilitation work.
- Management of electrical and other waste materials that can be generated during construction and operations activities.
- Noise pollution level during construction and operations activities.;
- Sewage system management at proposed sites site;
- Provision of short-term solutions while the project output will not yet achieve;
- Roles and responsibilities in implementation and monitoring of ESMP/RAP;
- Health and safety management during construction and operations activities¹.

The list of consulted people is presented in annexes.

5.3.2. Consultation at community level

At community level, consultative meetings were held in different localities of the project areas of intervention and gathered local population susceptible to benefit or be affected by project activities. Selection of the areas for interviews were based on the sites to be connected. In the entire province a total number of 200 people were contacted and among them 141 being male (70.5%) and 59 being female (29.5%)The list of consulted people is presented in Annexes. Local communities of the project sites who will be positively or negatively

¹ Health and Safety Plan was developed and is provided as annex 14 of this report and can serve as a modal for the contractor.

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. The figure below illustrates some of the consultation held on site during the conduct of the study.



Figure 3: Consultations with local community

Source: Field Consultation

Table 68: Summary of discussions with stakeholders

Discussions/ information	Outcomes
Will the project also contribute the issues of power shortage and drop outs that were currently experiencing in our areas?	it is intended that the upgrading of single-phase lines to three phase lines will increases the power supply in the area. It is no doubt that those challenges related to power shortage and drops will be managed accordingly. Supplied electricity will increase
Will be people going to be relocated where lines will be passing?	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.
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 change. Before construction of new houses in the grouped settlement construction permit must be requested from competent authority
Is the project going to give us jobs?	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.
Project line routes and alternative	The project designs were made to pass all along the buffer zones of existing feeder roads in project areas. Where not possible the MV lines will be passing

Discussions/ information	Outcomes
options what was based on to select the line routes?	in agricultural land and the best options to avoid damage and selecting the shortcut will be applied. The implementation of the project has been done in a way that will respect both national and international standards and regulations especially those related to electrical line constructions.
We are requesting to use our own poles from the main poles as we think EDCL's poles are expensive to connect their houses?	No single poles will be allowed except those being used by EDCL. Local community will be connected as per the existing regulation and no commissions shall be charged to get connected. Only poles that meet standards will be used.
Will all people be connected to the grid	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
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 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 very 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 protect and or avoid 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 69: Description of identified alternatives.

No	Alternative considered	Description
1	No-Go Option	This alternative means that no distribution lines are constructed, and the situation remains as it is.
2	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.
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 70: Analysis of alternatives

No	Alternative	Analysis
1	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

No	Alternative	Analysis
		access to reliable and safe electricity network without interruption, temporary and permanent employment opportunity from project implementation etc.
2	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.
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. 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 costlier 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 using overhead power lines 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 and Social Management Plan and monitoring plan as developed in this report.

7. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

Electrification projects are crucial to the economy, health, and welfare of the local community and the country in general. This chapter describes the potential impacts that may occur as a result of the construction and operation of the proposed 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 phase's lines. This chapter also contains the measures that will be implemented in order to mitigate these impacts. The assessment of impacts has been conducted against Rwandan requirements and applicable international police and standards especially the World Bank Standards and AfDB policies and Standards and policies. The potential significant environmental and social impacts of the electrification project are presented and their level of significance evaluated.

7.1. Project positive impacts

The project will be primarily implemented in rural centers and some smaller villages near roads, where small-scale handicraft units and workshops can benefit from a reliable and stable electricity supply. The advantages of the project are clear, including improved electricity access for households, small businesses, schools, and public services. Beneficiary enterprises contributing to regional socio-economic transformation will include small industries such as sawmills, grain mills, and other agricultural processing and storage businesses. The project will also enable data management through computers, improve communication facilities such as internet access and mobile phone charging, and enhance security at night through electric lighting, creating 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) 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 for 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 ensure no one is left behind.

b) 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.

c) Employment

The present project will involve different works including soil excavation, poles election, cable stringing, ROW clearance etc. These works require 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 laborers 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 behaviour and the conduct of those to be recruited.

d) 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.

e) 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. Positive impacts on health, water sector, education, security, communication and economic activities will be realized. Improved services will bring intrinsic benefits within the population and gradually improve on their quality of life.

✓ **Enhancement measures**

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

f) 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.

g) 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.

h) Provision of alternative sources of energy in the project area

As noted during the field surveys, in different areas not connected to national grid, local people are using wood fire 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.

i) Value addition to the agricultural products

Grinding mills and other machinery which can process agricultural products will be set up, or operate at a cheaper cost. This will provide value addition to the agricultural products produced by the local farmers there by boosting the economy and the farmer's income.

✓ **Enhancement measures:**

- Ensure that the distribution lines are maintained periodically to reduce on power shutdowns/shortages;
- Consumers should ensure timely clearance of electricity bills.

j) Creation of employment and better economic livelihood

During the construction period, employment will be created within the project area. Setting up of small-scale industries such as welding workshops, maize mills, carpentry workshops and other cottage activities will increase leading to further employment after completion of the project. On a short-term, the project will bring about creation of jobs during the construction phase (people in the project areas are likely provide labour force etc.). This impact will benefit the local retail business owners who would mainly benefit from secondary effects of increased incomes and the spending power of construction workers. Employment opportunities will arise and will benefit both the local community, regional and national community during construction, as well as during operations. Creation of job opportunities during project development, construction and operation will provide a number of employment opportunities for skilled, semi-skilled and unskilled labor. Recruitment of unskilled manual labor should give preference to local people wherever feasible. This impact will be beneficial to both men and women, especially when selling merchandise to workers. From stakeholder comments, some of the benefit to be accrued included:

- Improved lighting at a cheaper cost, electricity will replace the kerosene lamps that are not only more expensive but also environmentally hazardous;
- Increased radio listening time on account of cheaper electricity as compared to batteries;
- Increased productive hours;
- Eliminate the costs of self- electricity generation by existing commercial and industrial enterprises;
- The global benefits associated with savings in green house gaseous emissions due to replacement of kerosene and diesel.

✓ **Enhancement measures**

- Recruitment of labor and casual workers should give priority for employment to the local people within the project areas with respect to their skills.
- Workers employed to work at the construction site should be paid in time and issued with appointment letters or signing contracts.

7.2. Project negative impacts during planning and construction phase

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-economic impacts and their mitigation measures

a) Lack of qualified environmental and social risks management personnel and Instruments

This ESIA is prepared when the detail design is not yet conducted and there might be changes and addition information once the design is completed. Thus, it is important that resources are allocated for assessment site specific impacts, prepare and implement contractor management Plans. This requires recruitment of requires qualified people at contractor and supervising consultant to ensure that proposed mitigation measures are implemented and monitored.

❖ Magnitude

The magnitude is rated high as it may result from the failure of the project implementation in terms of socio and environmental compliance.

✓ Mitigation measures

- Recruitment of an environmental and social risk management expert (2) at EPC contractor and Environmental and Social Risk Management Expert in supervising engineer team;
- Preparation of Contractor - Environmental and Social Management Plans including at a minimum: Occupational Health and Safety Plan (a general plan is provided in this ESIA), Worker Codes of Conduct, Waste Management Plan, Traffic Management Plan and Site Restoration Plan., Waste Management Plan, Traffic Management Plan among others.

b) Labor influx

Project activities may attract many people in the project areas in search for employment and settlements. A number of workers will be engaged by the contractor to ensure completion of works as per schedule. The workers could come from the project area, neighboring districts or other areas in the country. Up to 20 personnel will be involved in erection of a single pole, with several others in conductor stringing and installation activities. Working conditions including wages, working hours, provision of PPE, use of child labor, provision of medical care, water and food, provision of sanitary facilities, sexual harassment among workers and to the community, and workers' grievances may arise. Further, cases of drunkenness, robbery and insecurity as well as pressure on existing social infrastructure.

❖ Magnitude

The sensitivity of receptors is rated high and magnitude of impact medium.

✓ Mitigation measures

- Maximum effort shall 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;
- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites
- Development and implementation of a Labor Management Plan
- Undertake training and awareness sessions for workers on SH, SEA, HIV/AIDS, STDs and communicable diseases.
- Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism;
- All workers to have contracts and time sheets for casual laborers;
- Persons seeking employment will have to be screened, including references from the local Council

Chairpersons of their villages of origin before engagement

- To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly;
- Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff.

c) Loss of crops and trees along the RoW and at poles foundations

The alignment of the distribution lines will to the most extent be restricted to the road reserve, pathways and agriculture lands/residential lands. Clearance of vegetation will take place along the RoW, access roads to pole sites, at pole sites, and staging areas among others. Crops and trees in gardens and woodlots are also likely to be affected during pole installation. There are also cultivated areas within the road reserves. Vegetation likely to be disturbed during site clearance for RoW include private woodlots, crops, grass and fruit trees along the roads. These are of economic value to the local community;

Other than clearance of trees in the RoW within the road reserve and access to the pole installation and work sites, additional clearance will be required to avoid tall trees falling on the energized lines, that would cut off power supply, cause economic loss and put the public at risk. Similarly, sections through woodland and thickets have to take into account safety of the lines. Uncontrolled disposal of construction waste may also impact upon vegetation.

❖ Magnitude

The impact is rated as moderate impact given that mitigation measures for compensation of affected crops were established.

✓ Mitigation measures

- Prepare and implement a resettlement plan once the right of Way is identified;
- 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;
- 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.
- Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations.
- All workers to be sensitized against unnecessary destruction trampling and clearance of flora,
- Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations
- Where losses of trees and perennial crops are inevitable, compensation measures be instituted as per the RAP prepared.
- Reforestation where possible to offset loss of fauna and flora
- Establishment and operationalization of community Grievance Redress Mechanism.

d) 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.

❖ Magnitude

The impact is rated as moderate impacts given that most of the work will be done manually and it can be mitigated if appropriate mitigation measures are implemented.

✓ **Mitigation measures**

- The entire project will be insured;
- The contractor will establish health and safety measures that must be implemented at the project site by all workers;
- Provision of appropriate Personnel Protective Equipment (PPE) to all employees;
- First aid kit will be provided and avail permanent at the work site;
- All project workers will be provided with health insurance as means of health affordability;
- Working conditions will respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda;
- 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;
- The safety plan and measure will be prepared and enforced at the project site;
- Sign boards at the project site will be provided to prevent accidents and troubles involving site workers.

e) Possible contamination 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

❖ **Magnitude**

The impact is moderate given that contractors will use mainly local workers who return to their home after work ..

Mitigation measures

- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour;
- 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 as means of health insurance

f) 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, erection 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. Accidents including cuts, pricks and bruises; electrocution from naked electrical cables; falling in uncovered manholes and trenches, from raised places and on slippery surfaces 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.

❖ **Magnitude**

The magnitude of this impact is considered as high as it may cause injuries and death on worse cases.

Mitigation measures

- Workers on the site will be provided with appropriate personal protective equipment (PPEs) such as; safety boots, helmets, reflective jackets, and overalls;
- 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;
- A qualified EHS officer will be available to monitor the overall compliance of the Environmental health and safety compliance;
- Toolbox talks on OHS, emergency response plans, labour management, traffic management, first aid training and response, etc. should be included in contractor obligations;
- 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;
- Workers with rescue and first-aid duties should receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their coworkers.
- Avoid excavation works in areas with loose materials in extremely dry weathers to prevent dust;
 - ✓ Exposed or faulty electrical devices, such as circuit breakers, panels, cables, cords and hand tools, can pose a serious risk to workers. Overhead wires can be struck by metal devices, such as poles or ladders, and by vehicles with metal booms. Vehicles or grounded metal objects brought into close proximity with overhead wires can result in arcing between the wires and the object, without actual contact. Recommended actions include:
 - ✓ Marking all energized electrical devices and lines with warning signs; Double insulating
 - ✓ grounding all electrical equipment used in environments that are, or may become, wet;
 - ✓ using equipment with ground fault interrupter (GFI) protected circuits · Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas
- 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.
- If visitors to the site can gain access to areas where hazardous conditions or substances may be present, a visitor orientation and control program should be established to ensure visitors do not enter hazard areas unescorted
- Contractors will be required to prepare OHS Management Plans

g) 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.

❖ Magnitude

The impact is rated as low given national policies especially free education and school feeding. Further its very is to verify age of workers.

Mitigation measures

- Avoid any form of discrimination or exclusion during project activities;
- Strict provisions to avoid 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.

h) Vandalism of the project materials

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.

❖ Magnitude

The impacts are moderate given that during construction material will be stored in protected areas

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.

i) Human waste disposal and other related issues

The construction of the proposed distribution lines will employ over 20 people at each active site during the construction phase. Sanitary waste will be an issue of concern since most of the workers will be carrying out various activities at the site throughout the day (8.00am-6.00pm). The sensitive receptors are the water sources from which the local community access water e.g. boreholes, unprotected springs, swamps, Lakes, Rivers and streams. Therefore, water sources are of a high value to the community members. If mitigation measures are not put in place indiscriminate disposal of human waste might occur which can culminate into health issues, including outbreak of diseases such as cholera. Poor human waste disposal will affect the water sources and soil in the project area.

❖ Magnitude

The magnitude of this impact is expected to be moderate since improper human waste disposal may affect water resources in the project area which the community depend on.

✓ Mitigation measures

- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility
- Workers should be made aware of the available sanitary facilities and trained on their use.
- Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address.
- Ensure that separate toilets are availed for both men and women and they should be well labelled.

j) Impacts on physico-Cultural Resources (PCRs)

During the consultations with the local community and local leaders, and from high spot surveys, no PCRs or sites of cultural or religious importance were identified to fall within the road reserves taking into consideration that most of the proposed line routes are within the local road reserve of the project areas. However, PCRs above may be encountered in the region or as the distribution line route is surveyed and constructed. Impacts on physico-cultural resources are likely to occur during clearance of right of way and excavations and access to pole sites, and during pole installations and conductor stringing. Maintenance

works may have limited impact if any, and will result from clearing of the right of way. These activities may lead to exposure and destruction of cultural artefacts such as pottery, lithic, bones and iron slag among others. An abbreviated chance find procedures was provided in annex 12 of this report to serve as guiding procedures in any case such findings are discovered

❖ **Magnitude**

The magnitude of impact is considered minor since excavations will be limited to the pole sites and taking into consideration that none of the PCRs has been identified and the sensitivity of high considering the sacred nature and attachment of communities to PCRs.

✓ **Mitigation measures**

- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW.
- Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner.
- Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance;
- Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district
- In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure. An example is provided in Annex 12.
- The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access.
- The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.

k) Potential impacts on roadside businesses

Loss of customer traffic: Construction activities such as trenching or pole installation may temporarily block or divert roads, reducing customer access to roadside businesses, which can result in a decline in sales and economic losses.

Physical damage to infrastructure: machinery and construction activities near roadside businesses can inadvertently cause damage to physical structures like storefronts, signage, or access paths, affecting business operations.

Mitigation measures

- To ensure active stakeholder engagement by informing roadside business owners about construction schedules and potential disruptions well in advance.
- To provide Temporary access routes to maintain customer traffic, while protective barriers to safeguard business properties from physical damage.
- Implementing dust suppression measures and scheduling disruptive activities outside peak business hours to minimize inconvenience.

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 traffic 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.

❖ **Magnitude**

The magnitude of the traffic flow impact is anticipated to be Moderate. Other power line routes with low traffic volumes are anticipated to have minor impact magnitude.

Mitigation measures

- Local traffic police will be involved for traffic monitoring;
- Where possible speed limit and other traffic signs shall be installed especially in project working areas.
- Traffic guides will be employed (flagmen) to control traffic;
- Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”.
- Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites;
- Project vehicles will give the right of way to the local vehicles in the project area.

b) Impacts on soil and water pollution

The works will involve excavations of pole sites and later back filling and if poorly compacted, loose soils may be eroded leading to siltation of natural drainage systems and water courses. The electricity poles will be rammed into the soil a distance of 1.5m and will be held in place, where necessary with concrete. For this reason, impacts will only be limited to the top soils, without significant intrusion to underlying groundwater, bedrock or any geological features. Soils, surface waters and groundwater will be susceptible to contamination from various sources during the poles installation process. The main source of contamination will be from the treated electricity poles which if poorly handled can lead to soil and water contamination. Hazardous materials and wastes include fuels, lubricants, containers and sanitary waste especially at the staging areas along the RoW. The quantity of hazardous materials onsite will be very small so only minor accidental spills might occur. Soil erosion could occur as a result of the removal of vegetation and the disturbance of soils by vehicles or equipment in areas where the distribution lines will transverse, particularly the pole sites. Siting of poles also has to take into consideration local drainage patterns and climate variability, particularly changes in rainfall intensity and the impacts of climate. The poles and distribution networks could be damaged by extreme rainfall events and floods if poorly designed.

❖ **Impact magnitude**

The quantity of hazardous materials onsite will be small so only minor accidental spills could occur, resulting in impacts of minor magnitude

✓ **Mitigation measures**

- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts;
- 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
- Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas.
- 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 fueling tankers other than fuel storage on sites
- The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground
- No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site;

- All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line
- Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works;
- Location of staging areas on steep gradients should be avoided to prevent increased erosion.
- All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes.
- 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 after poles elections.
- Store excavated soil in designated areas, away from water bodies, and cover it to prevent erosion and runoff.

c) Ambient air pollution

Through site clearing and excavation at some areas dust generation is expected. During construction, the ambient air quality at local receptors may potentially be affected by increased dust, particularly during construction material haulage, vehicle movements on unpaved roads, dust from uncovered stockpiled powdery materials or truckloads, emissions (e.g. NO_x, SO_x and CO) and particulates from vehicles, diesel generators, heavy plant and other mechanical equipment. The existing air quality in the project areas is not affected by any forms of industrial pollution except by dust associated with vehicular movements on the unpaved road network. Furthermore, 70% of the unpaved roads in the project area are not so busy to add on the effect of project vehicles and cause significant dust emission. The significance of dust impacts from movement of project vehicles is largely based on the proximity of sensitive receptors to the access roads.

❖ Magnitude

Particulate Matter and dust are likely to be a temporary nuisance for the local sensitive receptors; thus the magnitude of the impact will be moderate

Mitigation measures

- Works should be executed in short period of time to minimize the dust generation at the site;
- 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;
- All kind of burning of any kind of waste shall be prohibited at project site and its vicinities.
- 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 fueling 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) Impacts on noise and vibrations

Noise and vibrations will result from construction works, including excavations, concrete mixing and compaction at pole spots, and from vehicles transporting materials, equipment and workers. The receptors

of the noise and vibrations include project site workers, project nearby users and residential nearby areas in the vicinity of the proposed power distribution line routes.

❖ **Magnitude**

The magnitude of this impact is expected to be low given that there is no heavy machinery expected to be used for distribution project and works will be for a short period and only to be done during normal working hours.

✓ **Mitigation measures**

- Limitation of heavy works in daytime 7am to 5pm;
- Provision of PPE to workers;
- If necessary, local residents should be given notice of intended noisy activities so as to reduce degree of annoyances especially at the pipeline's construction sites.
- Workers operating equipment that generates noise should be equipped with noise protection gear.
- A regular monitoring of noise will be conducted as to check the compliance of noise pollution with permissible level.
- As most of the expected noise is from vehicles, truck and machines, the contractor will be requested to use equipment in good condition and certificate of technical control will be required
- Equipment with heavy noise and vibration will be restricted on normal working hours, from 7am to 5 pm,

d) Water and soil pollution due to oil spillage.

The expected liquid waste might result from leakages of oil from the transformers during its normal operation or defects. However, this 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 refilling and maintenance should be done with qualified and experienced personnel;

e) Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure

Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure may result in occupational and safety hazards. Thus it is important to protect employees from safety hazards that maybe 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.

❖ **Magnitude**

The impact is rated as substantial given that the project involves

✓ **Mitigation measures**

- 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
- Stringing activity around low- or high-tension wires and other electrical units could be a potential hazard

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.

❖ Magnitude

The magnitude of impacts is moderate given that sensitive and high value ecosystems have been and will continue to be avoided and the distribution lines will be installed in either road reserve and in existing settlements.

Mitigation measures

Bird strikes and collisions: 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.

Magnitude : Project impact is expected to be low to moderate in the project area, the route is not supposed to pass through any known migratory bird routes. However, if some sections cross wetlands, rivers, or areas used by residents and locally important bird species, the risk of bird collisions may be higher.

To minimize the negative impacts to Birds:

- Install bird flight diverters or line markers along sections crossing areas of high bird activity.
- Schedule construction outside key bird breeding or migratory periods where feasible.
- Regular monitoring of bird collisions during early operation phase and remedial measures if needed.
- Aligning distribution corridors to avoid critical habitats (e.g. nesting grounds, heronries, rookeries, bat foraging corridors, and migration corridors);

To minimize Habitat Disturbance:

- Restrict the Right-of-Way (RoW) strictly to the demarcated area.
- Avoid construction in sensitive habitats (wetlands, riparian zones, protected areas) where feasible.
- Limit vegetation clearing and inspection activities to essential areas only.
- To minimize negative impacts for amphibians, reptiles,
- **Avoid** aquatic breeding sites (ponds) and terrestrial habitats (woodlands, grasslands) during line route design

Restrain from activities that would disturb damp conditions, protect water quality, and avoid using hazardous chemicals preservatives for wooden pole protection; avoid disturbance of safe migration routes between ponds and terrestrial areas.

To minimize negative impacts on **Reptiles (e.g., lizards, snakes, turtles)**

- **Habitat Management:** conduct survey to identify mosaic habitats with varying vegetation and sunny spots for basking.

- **Vegetation Management:** Reduce potential reptile habitat in stages to allow for natural dispersal. A recommended approach is to cut vegetation in thirds, initially to 15-30 cm, then to ground level after several days.
- **Remove Refugia:** Carefully remove potential shelters (stone piles, debris) by hand before heavy machinery operates.
- **Translocation:** If necessary, capture and move reptiles to a designated receptor site away from the construction area by a qualified **Ecological Clerk** to check for reptiles before and during construction
- **To minimize negative impacts on mammals**
- **Avoid Habitat Destruction:** Limit vegetation clearing to the minimum required width, focusing on creating gradual ecotones rather than abrupt habitat edges.
- **Preventing Entrapment:** Install escape ramps in all open trenches and excavations to prevent mammals from becoming trapped.
- **Waste Management:** Remove food waste immediately to avoid attracting wildlife to the construction site.
- **Noise Reduction:** Use methods that reduce noise and vibration to minimize disturbance, particularly for sensitive species

Vegetation and Right-of-Way (RoW) Management

- **Integrated Vegetation Management (IVM):** Promote low-growing plant communities and native vegetation on the RoW, creating stable habitats that resist invasion by tall, problematic trees.
- **Habitat Creation:**
 - Instead of completely clearing vegetation, create "wire border zone" methods that encourage shrubland, offering habitat to small mammals.
 - The sites clearance should be only done on an area demarcated for project activities;
 - Conduct a pre-clearance survey by a qualified Environmental officer or biodiversity officer
 - 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 reptiles should be relocated to a suitable area immediately outside the construction footprint area but under no circumstance to an area further away
- Construction workers should be sensitized no to harm 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.

Reforestation where possible to offset loss of fauna and flora

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.

7.3. Adverse impacts during operation and maintenance phase

The following adverse impacts are anticipated to occur during the operation and maintenance phase of the project. Two universal concerns about 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-economic 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.

✓ 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.
- Personal protection gear will be provided, and its use made compulsory to all. The entire workforce of the plant should be trained in the use of protective gear, handling of chemical products and acid storage cells, electric safety equipment, procedures for entering enclosed areas, fire protection and prevention, emergency response and care procedures.
- Training given to the employees should be backed by regular on- site training in safety measures.
- Machines and Equipment must be operated only by qualified staff and a site supervisor should be always on site to ensure adherence.
- The contractor must develop workers' Health and Safety Manual for which all the workers should be conversant with for response in case of accidents.

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 contractor for use in each cabin.
- All of the cabins 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.

Mitigation measures

- Conductors along wetlands and in bird's migration areas will run horizontal not vertical.
- Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters

c) Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure

Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure may result in occupational and safety hazards. Thus it is important to protect employees from safety hazards that maybe 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.

❖ Magnitude

The impact is rated as substantial given that the project involves

✓ Mitigation measures

- 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
- Stringing activity around low- or high-tension wires and other electrical units could be a potential hazard
- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area
- Proper use of ladders and scaffolds by trained employees
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or selfretracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines
- Appropriate training in use, serviceability, and integrity of the necessary PPE
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall

d) Theft of equipment and Vandalism of power distribution infrastructure

During operation phase vandalism might lead to electrocution but the magnitude of the impact will be minor if the local community are sensitized on the negative effects of stealing and vandalizing electrical installations. Vandalism will also deny the local community the benefits of constant power supply due to the resulting disruptions.

❖ Magnitude

The impact magnitude is rated as substantial given that such vandalism impacts on the benefits of constant electricity supply, including improved social services and business productivity.

✓ **Mitigation measures:**

- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure;
- Workers to be employed on site should be vetted or obtain reference letters by their respective village;
- Contractor to engage a reputable security firm to provide security at sites, storage site, , staging areas, and during materials transportation;
- The security firms will be screened and references sought,

e) 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.

❖ **Magnitude**

The impact magnitude is rated substantial given that distribution lines are installed in existing settlement where people are leaving.

✓ **Mitigation Measures**

- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines;
- Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation;
- Liaise with local authorities to ensure developments are not approved or occur within the right of way.

f) 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.

✓ **Mitigation measures**

- Conductors along bird's habitat and in bird's migration areas will run horizontal not vertical.
- Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters

c) Pollution from transformer oil spillages

There is potential for accidental spillages from transformer oil at any stage of the project cycle that can be a source of concern i.e. during the preparation, construction stage at the equipment storage yard and during the operation phase when maintaining the transformers. This leakage can pollute soils and water sources. Transformers use oil which if not adequately handled might spill making soils, surface waters and groundwater susceptible to contamination during the installation process. Accidental spills can also be experienced when transporting oil to the sites for purposes of filling transformers that may have leaked their oil during transportation, storage, or installation.

❖ **Magnitude**

The magnitude of the impact is considered moderate considering the extent of pollution given the number of transformers to be used, but the sensitivity of receptors medium.

✓ **Mitigation Measure**

- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage.
- The Contractors shall also be required to develop and implement Standard Handling Procedures for

Transformers to take care of any oil spillage during transportation, storage and installation.

- Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species.
- Oil spill kits to be provided for during repair and maintenance of transformers

d) Vandalism of the electrical cables and other structures

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.

❖ Magnitude

The impact is moderate given that during construction material will be stored in protected areas

✓ 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.

7.4. Negative impacts during the decommissioning phase

a) Waste generation and inappropriate storage of electric equipment's

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.
- 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.
- 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.
- Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center.
- The wooden poles shall be used as source of energy for cooking by local people.

b) Water and Soil pollution from transformer oil spillages

There is potential for accidental spillages from transformer oil at any stage of the project cycle that can be a source of concern i.e. during the preparation, construction stage at the equipment storage yard and during the operation phase when maintaining the transformers. This leakage can pollute soils and water sources. Transformers use oil which if not adequately handled might spill making soils, surface waters and

groundwater susceptible to contamination during the installation process. Accidental spills can also be experienced when transporting oil to the sites for purposes of filling transformers that may have leaked their oil during transportation, storage, or installation.

❖ **Magnitude**

The magnitude of the impact is considered moderate considering the extent of pollution given the number of transformers to be used, but the sensitivity of receptors medium.

✓ **Mitigation Measures**

- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage.
- The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation.
- Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species.
- Oil spill kits to be provided for during repair and maintenance of transformers

e) Air pollution

Decommissioning impacts on air quality will be similar to construction impacts due to the presence of construction vehicles and trucks. This is considered to be a moderate negative impact as a result of localized dust.

❖ **Magnitude**

The impacts magnitude is rated as moderate given that no big demolitions are expected.

✓ **Mitigation measures**

- Personal protective equipment like dust masks will be availed to workers whenever needed;
- Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions;
- The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission.
- To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties
- unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles.

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. Given that detailed design has not yet been conducted to provide more information, the contractor will be required to use this report and prepare contractor Environmental and Social Management Plan (C-CESMP) for each surveyed line

It is important to note that the provided ESMP is covering the entire project in Eastern 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-EDCL and winning 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. Among other necessary and important plans that will be prepared by the contractor and approved by the supervising firm will include the Code of conduct for workers, Waste Management Plan, the Occupational Health and Safety plan, Traffic Management Plan, Labor Management Procedures as well as the Stakeholder's Engagement Plan. The Environmental and Social Management Plan (ESMP) was developed for all project implementing districts as part of the ESIA report. However, district-specific ESMPs were also prepared. These standalone ESMP for each district are annexed to this report and were developed based on specific bio-physical and socio-economic characteristics of each district project activities such as distance of the lines to be constructed, the estimated number of workers, cost of project materials and associated prices etc. The Next table present an Environmental Management Plan for the EPC of southern Province.

Table 71: Environmental and Social Management Plan

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD) ²
Design and Construction Phase					
Environmental and Social risk management	Lack of qualified environmental and social risks experts and E&S instruments for contractor and supervising engineer	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan(a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor &supervising firm	(6x700x12) = 57,600 ³ (4x800x12) = 38,400 ⁴
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of crops, and trees along the Right of Way and Poles foundations	Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works	REG-EDCL/EPC Contractor and District, Districts	
	PAPs complaints about their	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC	50,000 ⁵

² It is important to note that these estimated figures are based on experience from other projects. They are not final or definitive but rather indicatives.

³ One EPC contractor for two district was consider with two staff (800US\$ man month for 12 months' implementation period

⁴ Four staff by province are proposed for 12months period and 800US\$ man Month

⁵ Estimated based on what has been observed in other projects buy can vary once GRC are established

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
	assets affected by survey team			Contractor and District, Districts	
	Disruption of agricultural activities and land use restriction under RoW	- All crops, and trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops, - Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.	Ongoing	REG-EDCL/EPC Contractor and District, Districts	RAP budget
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of vegetation cover in in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - Conduct a preclearance survey by qualified environmental specialist to ensure flora and fauna of conservation concern are protected. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees and crops should be for only those that are more than 2m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses. - All trees, crops affected will be included in the RAP and compensated.	During site clearance	REG-EDCL/ /District REG-EDCL/ Contractor, Districts	To be included in EPC contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities;	During design and	EPC contractor	Mobilizati on and

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- Conduct a preclearance survey by qualified environmental specialist to ensure flora and fauna of conservation concern are protected. - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. - 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 - 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.	Site clearance		Operational Budget
Recruitment and employment	Labor influx/ Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall 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; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, District labour inspector/	32,000

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff			
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall 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; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff. - Work with Existing GBV and isange one stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts, Isange One stop center	18,000
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall 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 - SEA/SH suitable GRM will be established.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	22,000

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
	Child labor, forced labour and discrimination.	- 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. - No forced labor - No child labor	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Operational Budget
Foundatio n works, excavation , and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda; - Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	35,000(five thousands per district)
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Health and Safety issues	- 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;	Ongoing	EPC contractor, Supervising	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- 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; - 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 - Each site/CESMP will have a traffic management plan that will be displayed across the site and communicated to the local community and local authorities regularly.		engineer /district	14,000 (2,000 per district)
	Loss of on Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district;	Ongoing	EPC contractor, Supervising engineer /district	Operation al Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a “chance finds procedure; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.			
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas. - Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”. - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area	Ongoing	EPC contractor, Supervising engineer	Operation al Budget
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion. - All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes			
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, no biodegradable and hazardous streams, and dispose appropriately. - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance - The noise limits in the World Bank General EHSg will be followed.55 dB(a) daytime and 45 dB(a) nighttime in residential areas.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use.	Ongoing	EPC contractor,	15,000

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled		Supervising engineer	
	Oil spillage	- 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;	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
Poles erection, Stringing works, line energising and installation of transformers	Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure	- 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. - More details are included in Occupational health and safety	Ongoing	EPC contractor, Supervising engineer	Operation al budget
	Risk of accidents during lifting equipment to position, erection of poles, stringing and	- 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.	Ongoing	REG-EDCL/Contra ctor and Districts	Constructi on budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
	wiring as well as connection.				
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution through the proposed line	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure; - Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, , staging areas, and during materials transportation; - The security firms will be screened and references sought	Ongoing	REG-EDCL, District	Operational Budget
	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way; - Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)	Ongoing	REG-EDCL, District	Operational Budget
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operational Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation.	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		- Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers			
	<u>Fire accidents due to inappropriate power usage</u>	- A robust fire prevention program and fire suppression system should be developed by EDCL/REG for use in each cabin where there is an indoor transformer. - All of the cabins 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. - 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	Ongoing	REG-EDCL, District	Operational Budget
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Disruption of electrical supply due to encroachment of the RoW and	- 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	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
	plantation of high trees under electrical lines				
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regularly	REG/EDCL	Operational Budget
Decommissioning Phase					
Removal and disposal of electrical cables, poles and transformers	Waste generation and inappropriate storage of electric equipment's	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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. - 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. - Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and disposal. - Damage to native grasses and low shrubs vegetation onsite during decommissioning shall	Once	REG-EDCL, EPC contractor	Decommissioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementat ion	Budget (USD) ²
		be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species.			
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Total budget				267,000

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 of the monitoring activities as well as their estimated cost of activities. 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 and rehabilitation around project work sites
- Safety measures at the working areas
- Waste management and handling
- Complaints resolution and 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;
- Interviews

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 EDCL and 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 trees, crops and 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 environment 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. In the other case the re-routing of the line should be conducted.

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 disease and other contaminating diseases are taken;
- Preventive measures to avoid work accidents in project areas are in place and followed appropriately
- All site workers are insured with mutuelle de sante as means of health affordability.
- Non authorized personnel is entering the working areas especially during the cable stringing works

All districts of the project areas 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 the transmission and distribution line

5. Monitoring of waste management

The Contractor shall regularly monitor the management of project generated wastes focusing on:

- **Minimizing waste generation:** during site inspections, ensure that efforts are being made to minimize waste generation at all project sites. This includes assessing whether measures for reducing unnecessary material use and waste production are being implemented.
- **Waste segregation, reuse, and recycling:** monitor whether waste is being properly segregated at the source into categories such as biodegradable and non-biodegradable. Evaluate the extent to which materials are being reused or recycled wherever practical. This includes checking the availability and proper use of dedicated recycling facilities.
- **Adherence to the waste management hierarchy:** conduct regular checks to confirm that the waste management hierarchy is being followed. Ensure that waste prevention and minimization are prioritized, followed by reuse, recycling, and recovery before considering treatment and disposal.
- **Containment and appropriate waste management:** inspect construction sites to verify that all generated waste is adequately contained and managed in compliance with site-specific environmental management plans. Ensure no waste is left unattended or disposed of improperly.
- **Sewage disposal:** confirm that sewage from material storage sites is being disposed of appropriately into sealed pit latrines or other approved sanitation systems. Inspect the sanitation systems to ensure they meet regulatory standards and are maintained properly.
- **Availability of solid waste bins:** ensure that solid waste bins are available at all locations, with at least one bin for each category of waste (biodegradable and non-biodegradable). Check the bins for proper use and maintenance.

- **Avoidance of solid waste burning:** monitor sites to ensure that no solid wastes are being burned. Immediate corrective actions should be taken if waste burning is observed.
- **Ponding of water:** check for ponding of water near waste collection or storage areas. Ensure that any pooling of water is promptly addressed to avoid environmental or health hazards.
- **Compliance with environmental standards:** ensure that all waste management activities comply with applicable environmental laws and regulations. Any non-compliance should be reported and rectified immediately.

Table 72: Types of wastes to be monitored and their alternative destinations

Waste	Hazardous waste	Destination	Frequency of evacuation
Soils and grass from clearing	No	Will be reused for landscaping	NA
Soils & stones contaminated With dangerous substances such as fuel, engine oil and lubricants	Yes	Temporarily disposed them to designated area site then or evacuated to the identified local disposal site.	Weekly
Soils & stones not contaminated with dangerous substances	No	Reused for backfilling and landscaping where applicable	NA
Mixed construction & clearing waste containing potentially dangerous substances	Yes	Temporarily disposed them to designated area site then or evacuated to the identified local disposal site (approved dumpsite), through an approved waste management company.	Weekly
Mixed construction & clearing Waste not containing dangerous substances	No	Reused for backfilling and landscaping where Possible and excess transported to approved dumping sites by the Engineer	NA
Aggregate /concrete / masonry if any,	No	Reused as hard core where possible and the excess stockpiled on suitable locations approved by the Engineer	NA
Timber	No	Reuse suitable timber and wood for general use on Site	NA
Metals	Yes	Temporarily disposed them to designated area then latter given to an authorized person for recycling.	Before project close as part of general site cleaning
Paper / cardboard	No	Dispose to the local disposal or disposed of at licensed landfill facility (no recyclables). Site	Weekly
Plastics including plastic Packaging	No	Temporarily disposed them to designated area then r evacuated to the identified local disposal site.	Weekly
Cables	No	Temporarily disposed them to designated area then or evacuated to the identified local disposal site.	One at project completion
Insulation materials	No	Temporarily disposed them to designated area then or evacuated to the identified local disposal site.	One at project completion

Waste	Hazardous waste	Destination	Frequency of evacuation
Food waste	No	Temporarily disposed them to designated area then or evacuated to the identified local disposal site.	Twice a week
Plastic, glass and aluminium cans	Yes	The recyclable material is collected weekly by a licensed contractor and transported to a licensed (authorized by REMA) recycling facility for sorting. Printer cartridges are collected for recycling by the supplier at the time of delivery of new supplies	Weekly
Fuel, oil, grease and lubricants from spills.	Yes	Any spills have avoided prior to preventing water pollution. In any case of spill, release into a temporary pit far away from the site (away from the river) before being transported to the authorized landfill.	As soon as it happens

The next table summarizes other item to be monitored as part of the implementation of the overall Environmental and Social Monitoring

Table 73: Environmental and Social Monitoring Plan to be implemented in each district of the province

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Land acquisition and compensation	Fair compensation for affected crops, trees that will be affected by the project s	Reports for affected crops, trees	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	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	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	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	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	regular	EDCL/ Districts	No cost is required

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	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	Permanent	EDCL/ Districts	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	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	daily	Districts/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	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	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	regular	EDCL /Local authorities/ project workers/ local population	No cost is required

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Labor influx	Number of workers hired from the community	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV Number of trainings on SEA/SH preventions provided Number of workers who signed code of conduct	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of signed Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Tree removal (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	Once	EDCL / Contractor/ Districts	700
Operation phase					
Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ Districts district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
Total					22,290

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 line's constructions in different districts of the eastern Province. Districts 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 monitoring provisions.

The contractor will also have an Environmental Health and Safety officer to oversee the implementation of project during construction phase. The main duties of the designated Environmental and social staff will include but not limited to:

- Have an oversight 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. Roles 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. Roles of contractors

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. Roles 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 Risk Management Specialists shall work closely with EDCL Environmental and Social Risk Management 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 and to review contractors' plans: CESMP, OHP, Waste Management, Traffic Management, etc.

8.3.6. Roles 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 stakeholders involved in electrical energy transmission and distribution and in general develop policies and guidelines and laws related to energy generation and distribution.

8.3.7. Roles 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. Roles of REMA

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.

8.3.9. Roles 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. Roles of local communities

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.

8.3.11. Roles of 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.

8.4. Grievance Redress Mechanism (GRM)

The implementation of the project will involve limited land acquisition recruitment of workers and will affect some assets privately owned by local people such as trees and crops. Both land acquisition and use of workers are associated with potential grievances for both the community, project affected people and workers. In compliance with ESS2, ESS5 and ESS 10 as well as the Rwanda Expropriation law and labour law, REG-EDCL is required to establish, implement and monitor Grievance Redress Mechanism (GRM) for this project implementation. The GRM will help the project implementing entity to manage all kind of grievances raised by all stakeholders including a workers' GRM under ESS 2 and a community GRM for PAPs under ESS5 as well as while GBV related complaints that will be managed through existing mechanism such as GBV taskforce and existing Isange one stop center establish in each district.

The GRM will enable REG-EDCL and both districts of the intervention to address any grievances against the Project. The establishment of project level Grievance Redress (GR) will integrate with existing GR structures in the respective communities and the implementing agencies; and maintained and strengthened throughout the project lifecycle. The GRM will be closely monitored and reported throughout the project life cycle.

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 a proponent/operator and external stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

8.4.1. Objectives of GRM

The main objectives of establishment of GRM within the project implementation are:

- a) **Prompt and fair resolution:** the GRM aims to resolve complaints and concerns efficiently, fairly, and in a timely manner. This ensures that legitimate grievances are addressed and resolved during project implementation.
- b) **Accessibility and inclusiveness:** the mechanism is designed to be easily accessible to all stakeholders, ensuring that everyone affected by the project has an opportunity to raise concerns.
- c) **Minimization of project disruptions:** by addressing grievances early and effectively, the GRM helps prevent interruptions in the project timeline, such as work stoppages, protests, or legal battles, which could delay project completion.
- d) **Continuous improvement:** a well-functioning GRM provides feedback to project implementers, helping them identify areas where improvements are needed. This helps improve the overall quality of project management and implementation.
- e) **Compliance and monitoring:** It ensures that the project complies with national laws, donor requirements, and environmental and social standards. The GRM also helps in monitoring the project's impact on the community and its surroundings.

For the present project, it is proposed to have (i) community grievance redress mechanism that focuses on grievances associated with land acquisition and compensation process, (ii) worker's grievances redress mechanism, and (iii) Grievance redress mechanism for GBV and Sexual Exploitation that will be addressed through existing mechanism.

8.4.2. Community level Grievance Redress Mechanism

The project grievance mechanism will not impede workers or project affected people's access to the legal system. Local communities have existing traditional and cultural grievance redress mechanisms (Abunzi committees) established and regulated by law no 37/2016 of 08/09/2016 determining organization, jurisdiction, and competence and functioning of Abunzi committee (adjudication/mediation committees). These are established at cell and sector levels to solve community-based conflicts and grievances their regulatory body being the ministry of Justice. This mechanism cannot be overlooked by the project. The population can choose to use this channel instead of the project grievance mechanism. The escalation at

this level leads to the court process. At any time, the complainant may take the matter to the appropriate legal or judicial authority. The traditional and cultural grievance redress mechanisms can also be used to resolve some project related disputes at the community level, of course with some degree of involvement and support from local leaders, the contractor(s), and project representatives at local level. However, this method cannot handicap the establishment of the GRM at project level.

To support the existing structure and in compliance with expropriation law and the World Bank ESS5, and ESS10 it proposed to establish community grievance redress mechanism which will include a Grievance redress committee at cell level/ site level and an appeal committee at the Sector level. At these levels, potential members of GRC include but not limited to:

- The President of the committee, a community member of affected people residing in the concerned area and preferably, affected by the project,
- The Vice President, also a community member residing in the concerned area and preferably, affected by the project,
- A woman representative, also a community member residing in the concerned area and preferably, affected by the project,
- Vulnerable group representative (if any);
- Village leader for the cell level committee
- A representative of Village leaders (if it is at sector level) and the Executive Secretary of the Cell;
- A representative of the Executive Secretaries of Cells (at Sector level)
- One District official. Cell leaders and the Executive Secretary of the Sector (if it is at the Sector);
- Project representative
- Contractor and supervising firm representative;

Roles and responsibilities of these members are summarized in the next table below:

Table 74: Proposed Members of GRC and their roles under 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 s/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.
3	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
4	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.

No	Member of GRC	Roles and responsibilities
5	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 areas of intervention.
6	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.
7	Supervising firm representative	- Represent client (REG-EDCL); - 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 project from community; - Report on monthly basis the progress of GRM process.

It is expected that all grievance or dispute issues pertaining to the project will be resolved at cell and Sector level committees. Issues that will not be resolved at the level of these committees will be taken to the higher Project Coordination Unit and district management. However, the mechanism will not prevent unsatisfied complainants to resort to the Rwandan judiciary (mediators and courts).

The grievance redress committees will be recording all the grievances. They will be recording when and how they were resolved including cases that got referred to other levels. They will be including these in their regular reporting. The project coordination unit will lead and record all complaints and how they were addressed. The community grievance redress system will work as follows:

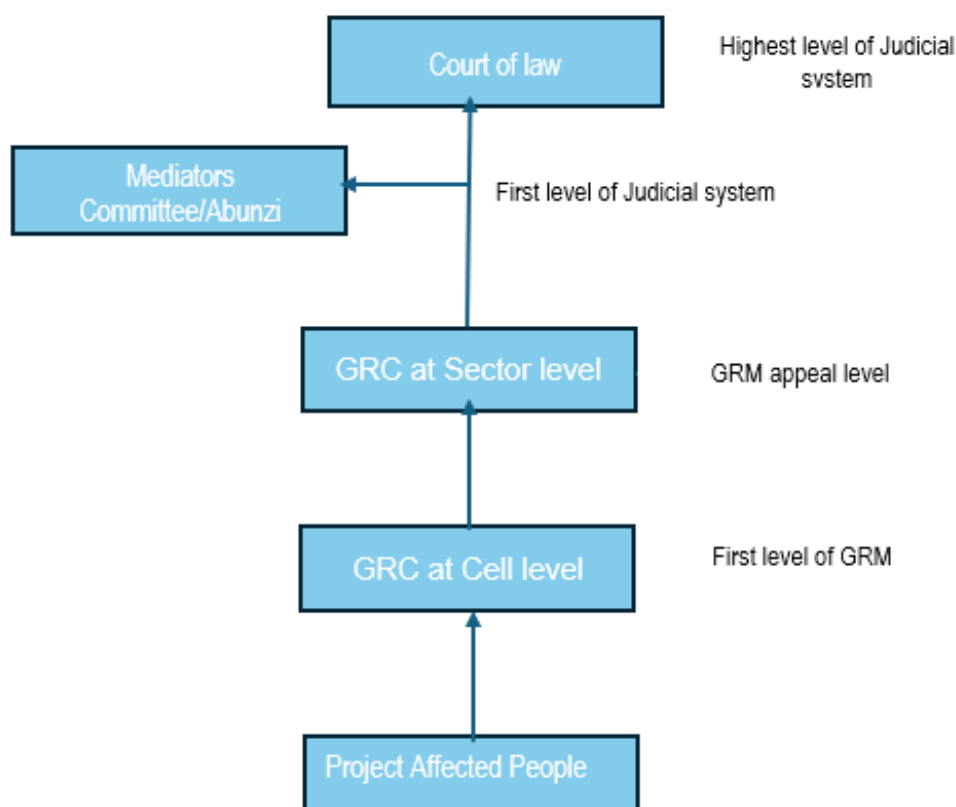


Figure 4: Proposed community GRM flow chart

a. Project Affected Persons

Project affected people (PAP) will be informed and made aware of grievance redress mechanism and encouraged to use these mechanisms. Any aggrieved person will forward his/her grievance to the nearest GRC. Papas will also participate in planning and implementing land acquisition and compensation process and provide information required to address grievances lodged by affected people.

b. Grievance redress Committees at site level/cell level

This committee will plan for, coordinate and monitor compensation activities, as well as supervise compensation payments to the recipient PAPs. It is recommended to have site GR committee that would comprise of the following:

- Representative from Sectors
- Representative of the cells that are affected
- Representative from the District Development Committee;
- Representative from any other key sector office involved in the resettlement process;
- Two representatives of PAP by cells (equal gender representation).

The Grievance committee would have responsibility for:

- Verifying PAPs;
- Validate inventories of PAPS and affected assets;
- Allocate land, where required, to permanently PAPS;
- Monitor the disbursement of compensations of affected assets
- Guide and monitor the implementation of relocation (if any)
- Coordinate activities between the various organizations involved in relocation;
- Facilitate conflict resolution and addressing grievances; and
- Provide support and assistance to vulnerable affected households including widows, orphans, and the old persons among others (if any)

This committee should meet on a regular basis (as determined by the needs of the project) to ensure the smooth implementation of the project and that project activities are appropriately designed and executed. It is recommended that a representative be elected to act as the District Project Coordination officer who would act as the key contact with PAPs and therefore facilitate implementation of consultation, public participation and grievance mechanisms.

c. Sector Grievance redress committee

Each district of the project area of intervention will work closely with REG-EDCL in the establishment of Grievance redress committee in the affected sectors. The grievance redress committee will include

- Sector electrical Engineer,
- Land Bureau officer,
- Social Safeguards specialist;
- Executive secretaries of affected sectors;
- PAPs representatives.

Its initial role will be to undertake screening and assessment of potential subprojects. The committee will be also responsible to address any grievances which is not satisfactorily addressed by site committee. The team will be supported by the project Social Safeguards team based at project headquarters.

At these levels, the overall process of grievance is as follows:

- During the initial stages, the valuation process, the affected persons will be given copies of grievance procedures as a guide on how to handle the grievances.
- The process of grievance redress will start with registration of the grievances to be addressed for reference, and to enable progress updates of the cases.
- The project will use a local mechanism, which includes resettlement committees, peers and local leaders of the affected people. These will ensure equity across cases, eliminate nuisance claims and satisfy legitimate claimants at low cost.
- The response time will depend on the issue to be addressed but it should be addressed with efficiency.
- Compensation will be paid to individual PAPs only after a written consent of the PAPs, including both husband and wife.

The aggrieved person should file his/ her grievance, relating to any issue associated with the project implementation, in writing to the subproject. The grievance should be signed and dated by the aggrieved person. REG- EDCL social safeguards officer and the Grievance Committee will consult to determine the validity of claims. If valid, the Committee will notify the complainant, and s/he will be assisted. The Grievance Committee will respond within 14 days during which time any meetings and discussions to be held with the aggrieved person will be conducted. If the grievance relates to valuation of assets, a second or even a third valuation will be undertaken, until it is accepted by both parties. These should be undertaken by separate independent valuers than the person who carried out the initial valuation.

d. District and project management

If the aggrieved person does not receive a response or is not satisfied with the outcome within the agreed time, s/he may lodge his/her grievance to the relevant district administration such as the district one stop Center, also mandated to help resolve such matters. If requested, or deemed necessary by the subproject Committee, the District Project Coordination officer will assist the aggrieved person in this matter.

The relevant Local Administration will then attempt to resolve the problem (through dialogue and negotiation) within 30 days of the complaint being lodged. If no agreement is reached at this stage, then the complaint is dealt with through the local courts (Abunzi) where possible.

e. Court of law

If administrative ways of grievance redress are not enough to address the complaint, then the aggrieved person may refer to judicial system. Based on the nature of complaints and value, the process will start from mediators for asses below 3 million Rwandan francs and if the value is more than three million, the process will start from intermediate courts, High court and to Supreme Court. The next table summarizes the process for grievance redress mechanism at community level.

Table 77: Grievance Redress Process at community level

Stage	Process	Duration
First level of	If the Aggrieved Party (AP) is not satisfied will take his/her grievance to Cell Grievance Committee which will endeavour to resolve it immediately. Where the AP is not satisfied, the Cell Grievance Committee will refer the AP to the Sector Grievance Committee. For complaints that were satisfactorily resolved by the Cell Committee, the committee will inform the higher level of project management, and they will log the grievance and the actions that were taken and close the grievances	As soon as possible but not exceeding four days after receiving the complaint
Appeal level	If the grievance is not resolve at cell GRC, the aggrieved Party will have the opportunity to appeal at GRC established at Sector level. On receipt of the complaint, the Sector Committee will endeavour to resolve it immediately. If unsuccessful, they will then notify the district and the project management which will attempt to resolve the grievances administratively committee before the case can go to the judicial system.	As soon as possible but not exceeding one week after receiving the complaint
Final stage of grievances redress	Unsatisfied complainants who is not satisfied after all attempts conducted through Grievances committee and administrative channels, will be allowed to take their complaints to the existing courts.	Any time depending on court schedule

8.4.3. Workers Grievance Redress Mechanism

Workplace concerns are usually different from issues raised by project-affected parties and other stakeholders, and therefore call for a separate mechanism to address them. The design of a workplace grievance mechanism includes elements of a grievance mechanism at community level but include features specifically designed to address workplace concerns. The ESS2 and law N° 66/2018 of 30/08/2018 and its amendment of 18/05/2023 regulating labour in Rwanda provisions will be applied for Grievance Redress Mechanism (GRM) for workers. A GRM shall be established at site level by the contractor to address complaints arising during the project implementation. Project direct workers will be informed about the grievance redress mechanism during meetings at the time of the induction and where training will be provided where required, this will follow the same procedure for grievance management. Contracted workers will be informed about grievance redress mechanism through meetings at workplaces as well as notices to be made available at the workplace. The Grievance Redress Committees (GRCs) to be established as mentioned earlier will also handle the arising grievances. The process pertaining to how to go about grievances handling are documented for further reference.

The workers GRC shall be composed at Site level by the contractor representative, the supervising firm representative, and the workers representative at site level while the GRM at District level shall be composed of Labour inspector at District level as advisor, Workers representative, contractor representative, the supervising firm representative, and at SPIU Level, the committee will be composed of the Social and Environmental safeguards Specialists, Project Coordinator, Human Resource Specialist under SPIU (REG-EDCL), and contractor representative, the supervising firm representative and workers representative.

REG-EDCL will require contractors to develop and implement a grievance mechanism for their workforce including sub-contractors, prior to the start of onsite works. Contractors will prepare their labour management Plans before the start of civil works, which will also include detailed description of the worker's grievance mechanism.

The worker's grievance mechanism will be prepared in line with the project Labor management plan and include:

- A procedure to receive grievances such as comment/complaint form, suggestion boxes, email, a telephone hotline;
- stipulated timeframes to respond to grievances;
- A register to record and track the timely resolution of grievances;
- A responsible department to receive, record and track resolution of grievances.

The Supervision firm's safeguards staff will monitor the contractors' recording and resolution of grievances, and report these to the project in their monthly progress reports. The process will be monitored by the GRM Focal Point; the safeguards specialists will be responsible for the project GRM. The direct worker's grievance mechanism will be described in staff induction trainings, which will be provided to the new recruited project workers. The mechanism will be based on the following principles:

- The process will be transparent and allow workers to express their concerns and file grievances;
- There will be no discrimination against those who express grievances, and any grievances will be treated confidentially;
- Anonymous grievances will be treated equally as other grievances, whose origin is known;
- Management will treat grievances seriously and take timely and appropriate action in response.

Information about the existence of the grievance mechanism will be readily available to all project workers (direct and contracted) through notice displaying boards, the presence of "suggestion boxes", and other means of communication as required.

For Worker and Labor contracting issues

- **Individual labour disputes: Article 102 of law n° 66/2018 of 30/08/2018 regulating labour in Rwanda.**

Workers will elect representatives who will form a committee that will act as the Workers Grievance Redress Committee. As mandated by article 102 of the law regulating labour in Rwanda, the employees' representatives amicably settle individual labour disputes between employers and employees. If employees' representatives fail to settle the disputes amicably, the concerned party refers the matter to the labour inspector of the area where the contractor is located (district of the project area of intervention).

If the Labor Inspector at the District fails to settle the dispute due to the nature of the case or the conflict of interests, he/she refers the dispute to the Labor Inspector at the national level stating grounds to refer such a dispute. If amicable settlement fails at the national level, the case is referred to the competent court. In any case, the Project Implementation Unit (PIU) will be informed from the beginning of any worker's grievances and provide insight and mediation if possible. The matter will be referred to the labour inspector only if the PIU fails to do the mediation.

- **Collective labour disputes: LAW N° 66/2018 OF 30/08/2018 regulating labour in Rwanda**

The law requires that collective labour disputes be directly notified to the labour inspector of the area by the worker's representatives. Within this framework, any collective labour disputes that will arise under Project, will be addressed to labour inspector at District level for assessment and settlement. In case of escalation, the matter will be referred to the national level. Before escalating the collective labour dispute, the PIU though the Social Safeguards Unit will be alerted. Necessary investigations will be conducted, and the contractor will be duly approached. The matter will be referred to the labour inspector only if the PIUs and worker's representatives fail at amicable settlement.

For worker's safety issues

All grievances related to worker's safety will be addressed through the Occupational Health and Safety committee as required by Article 78 of the labour law.

Grievance process for non-labour related issues involving project workers

In the project area there might be other conflicts related to relationships between the workers and the local community. Depending on who is the aggrieved party, the following mechanism will be used:

- **Worker- Against Other Worker:** These grievances will be handled through the Workers Grievance Committee/representatives.
- **Community Member – Against a Worker:** If there is any grievance from a community member against a worker, it will be handled through the Workers Grievance Committees/representatives.
- **Worker - Against a Community Member:** The project will establish a project grievance committee at various levels of the local administration scheme in Rwanda from the Cell, Sector up to the district government. This grievance Mechanism as described in the SEP and ESMF, will have the mandate of solving all complaints and grievances related to project activities and impacting local communities. Any grievance from a worker against a community member will be handled through this committee.

The project grievance mechanism will not impede workers or project affected people's access to the legal system. Local communities have existing traditional and cultural grievance redress mechanisms (Abunzi committees) established and regulated by law no 37/2016 of 08/09/2016 determining organization, jurisdiction, and competence and functioning of Abunzi committee (adjudication/mediation committees). These are established at cell and sector levels to solve community-based conflicts and grievances their regulatory body being the ministry of Justice. This mechanism cannot be overlooked by the project. The population can choose to use this channel instead of the project grievance mechanism. The escalation at this level leads to the court process. At any time, the complainant may take the matter to the appropriate legal or judicial authority.

8.4.4. Gender-Based Violence related complaints

Due to sensitivity and skills required to address gender based violence, the project will rely on existing structure including GBV task force and Isange one stop center. Thus, when GBV related complaint is received at the first or second tier of GRM, the complaint should be kept confidential by the person/persons receiving the complaint. The complaint should be reported to the relevant committee and immediate actions should be taken that is survivor centered and consistent with the wishes and choices, rights and dignity of the complainant. The complainant should be given information in simple and clear terms on the steps for filing complaints and the possible outcomes, the timelines and the types of supports available to be able to make informed decision.

For GBV cases, it is important to ensure that access to the complaints processes is as easy and as safe as possible for the complainant survivor. The recording of incidence should be limited to the nature of complaint put exactly in the words of the complainant, the age of the survivor and if to the best of their knowledge, the perpetrator was associated with the project. The complainant should decide on whether they would like to be referred to the above committees and the complainant should give consent to share basic monitoring data. In handling GBV related complaints at all levels the following principles should be observed:

Safety & Well-Being: The safety of the survivor shall be always ensured, including during reporting, investigation, and the provision of victim assistance. Those involved in the management of complaints will need to consider potential dangers and risks to all parties (including the survivor, the complainant if different, the subject of the complaint, and the organizations involved), and streamline ways to prevent additional harm in all the complaint handling process. The survivor is never to blame for reporting an act of GBV and should never be made to feel investigated. On the contrary, it is important that she/he feels that her/his story is

heard, believed and valued. The actions and responses of the complaint mechanism will be guided by respect for the choices, needs, rights, and the dignity of the survivor.

Confidentiality: The confidentiality of complainants, survivors, and other relevant parties must be always respected. All GBV-related information must be kept confidential, identities must be protected, and the personal information on survivors should be collected and shared only with the informed consent of the person concerned and on a strict need-to-know basis.

Survivor-Centered Approach: All prevention and responses action will need to balance the respect for due process with the requirements of a survivor-centred approach in which the survivor's choices, needs, safety, and wellbeing remain at the centre in all matters and procedures. As such, all actions taken should be guided by respect for choices, needs, rights and dignity of the survivor, whose agency and resilience must be fostered through the complaint process.

Accessibility and non-discrimination: The mechanism must be accessible to all potential complainants and sufficient information must be given on how to access it, making the complaints process accessible to the largest possible number of people. This includes identifying and instituting various entry points that are both gender and context sensitive. To facilitate incidents reporting and avoid stigmatization, reports from third parties (witnesses, people suspicious or aware of an incident, etc.) must also follow accountability protocols in case of occurrence, the sanctions stipulated by Rwanda labour law will be applied.

All SEA/SH related grievances however needs to be reported to the world bank as per the ESCP.

8.4.5. Grievance Logbook

At each level Grievance redress mechanism, the committee should ensure that each complaint has an individual reference number and is appropriately tracked and recorded actions are completed. The log will contain record of the person responsible for an individual complaint, and records dates for the following events:

- Date the complaint was reported;
- Date the Grievance Log was added into the project database;
- Date information on proposed corrective action sent to complainant (if appropriate);
- The date the complaint was closed out; and
- Date response was sent to complainant.
- Any outstanding issues to be addressed; and

A Monthly report, including analysis of the type of complaints, levels of complaints, actions to reduce complaints and initiator of such action.

8.5. Environmental and social safeguards training and capacity building

8.5.1. Environmental and Social training

The Project's environmental and social training programs will include several levels of competency, depending on everyone's level of involvement and responsibility:

- **ESMP induction training and awareness:** this training will be for visitors or individuals who do not have direct roles or responsibilities for implementing the ESMP and will cover basic project environmental and social commitments.
- **ESMP Management Training and Awareness:** this training focuses attention on management, covering key aspects of the ESMP and providing an overview of the Project's environmental and social impact management expectations and the supporting processes and procedures prescribed in the ESMP to meet performance expectations.
- **ESMP 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 ESMP including EPC contractor workers. This training will also include all people whose specific work activities may have an environmental or social impact.
- **Onsite,** these provisions and responsibilities will apply to all contractors and subcontractors. 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 a contractor to institute training programmes for their personnel. The contractor and subcontractors will be responsible for implementing relevant and adequate training programmes to maintain the required competency levels. Contractor training programmes will be subject to approval by Project Management and will be assessed to confirm that:

- Training programmes 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. The table below provides key training to be provided through the project implementation.

Table 75: ESHS training plan

Training course	Unskilled labour	Skilled labour	Supervisors	Drivers	Safety men	Timeframe	Responsible
Introduction to the OHS	x	x	X	X	x	After each recruitment and at each site visit	Contractor
Induction training and awareness	x	x	X	X	x	After each recruitment and at each site visit	Contractor
Emergency response	x	x	X	X	x	After each recruitment	Contractor
Hazards & controls			X			After each recruitment	Contractor
Foreman responsibilities			*			After recruitment	Contractor
Managing safely			X			After each recruitment	Contractor
Managing rule breaking				X		After each recruitment	Contractor
Fire prevention	*	*	X		x	After each recruitment	Contractor
First aid	*	*	*			After each recruitment	Contractor
Back safety/ lifting safety	x	x	X			After each recruitment	Contractor
PPE	x	x	X	X	x	After each recruitment	Contractor
Fall protection		*	*			After each recruitment	Contractor
Hand safety	x	x	X	x	x	After each recruitment	Contractor
Hazard recognition	x	x	x	x	x	After each recruitment	Contractor

Training course	Unskilled labour	Skilled labour	Supervisors	Drivers	Safety men	Timeframe	Responsible
Health & hygiene	*	*	x		x	On quarterly basis	Contractor
HIV/AIDS and Communicable disease	*	*	x		x	On quarterly basis	Contractor
Environmental awareness	x	x	x		x	On quarterly basis	Contractor
Excavation safety	x	x	x		x	Before excavation work	Contractor
Risk assessment		x	x		*	After each recruitment	Contractor
Safe use of chemicals	x	x	x	x	x	Before commissioning	Contractor
Accident prevention	x	x	x	x	x	After each recruitment	Contractor
Sexual abuse and sexual exploitation	x	x	x	x	x	On quarterly basis	Contractor
Chance finds procedures	x	x	x	x	x	Before excavations	Contractor

Key: x= compulsory

*=selected personnel

Training will be provided by ESHS officer in contractor team and outsource qualified expert and sub consultant hired by the contractor. The number of people to be trained for each topic will be known after recruitment of labours and screen them to define the training appropriate for each category depending on the expertise and knowledge.

8.4.2. Community awareness, outreach, and training

In addition to the ESHS training provided by the contractor, the project will provide training, awareness, and outreach programs to the local communities. Training will be provided to different committees established including the Water users' association and Grievance Redress Committees on conflict resolution and grievances management. Local communities will be also trained on different topics including HIV/AIDS, Sexual Exploitation; Gender Based Violence, water borne diseases etc.

Table 76: Community outreach and training

Training	Targeted group	Estimated budget (\$)
Conflict resolution and Grievances management	Grievances redress committees Water users' association	42,000
HIV/AIDS, Sexual Exploitation; Gender Based Violence, water borne diseases	Local community in three projects	40,000
Total		82,000

CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

Access to electricity is one of the primary limitations to the Rwanda economy; providing that 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 ESIA 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. Various social issues raised during stakeholder engagement, can be better managed, as detailed in ESMP. The specific negative social impacts related to vulnerable groups, like women and children, requires specific attention and exceptional implementation and management.

The 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 report are fully implemented, it is no doubt that the project will benefit to both people and the environment. Projects benefits are over balanced than the negative impacts which mitigation plan has been prepared. Furthermore, project developer will carefully consider and apply all acceptable local and international standards/ regulations at all stages of the project implementation.

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 and other project structures such as transformer's locations. Further, income loss is expected during project works with loss of trees and crops. A proper planning and preparation of RAP is recommended to minimize such impacts. In any case potential disputed among workers and local community 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 commencing any physical or on site work, the client must prepare RAP, consulted upon, publicly disclosed and implemented.
- ✓ Before commencing any physical or on-site work, the contractor must prepare the C-ESMP, which must be approved by both the client and the donor. The contractor's Environmental and Social

Management Plan shall be site-specific and include detailed information aligned with the project design reports.

- ✓ Before the implementation of the project, EDCL shall secure in full the locations of poles and project facilities such as transformer locations, temporally materials storages sites etc. and this to be accomplished via fair compensation and land easement via negotiations with land owners.
- ✓ The proposed teams for both contractor and supervising engineer should include environmental and Social risk management Experts for the entire duration of the project implementation;
- ✓ A resettlement Plan should be prepared for each districts to provide framework for compensation of affected crops, trees, asstes and other structures in the right of way;
- ✓ 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 (EDCL) 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: Terms of reference for ESIA of EPC East

TERMS OF REFERENCE FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROJECT OF DESIGN, SUPPLY, AND INSTALLATION OF LOW VOLTAGE AND MEDIUM VOLTAGE LINES AND SERVICE CONNECTIONS IN THE EASTERN PROVINCE- EPCS EAST

1. BACKGROUND

The Government of Rwanda (GoR) envisages transforming the country from a developing country to a middle-income country and it believes that universal access to electricity constitutes a determinant factor to achieve this goal by 2024. Successive documents set out this strategy in increasing levels of detail, running from Vision 2050, the National Strategy for Transformation (NST1), the Energy Sector Strategic Plan, the Rural Electrification Strategy, and the National Electrification Plan 2018- 2024 (NEP) developed by EDCL /REG to guide the investments in electrification and how to achieve the access targets within the framework defined by NST1 and ESSP.

In the implementation of these strategic plans, the Government of Rwanda (GoR) through the Ministry of Infrastructure (MININFRA), with the funding from the World Bank/International Development Association (IDA) and other Development Partners (DP) namely African Development Bank (AfDB), European Investment Bank (EIB), OPEC Fund for International Development (OFID) and Saudi Fund for Development, Korean Economic Development Cooperation Fund (EDCF) and Agence Française de Développement (AFD) , is developing a program titled “Rwanda Universal Energy Access Program which comprises two projects namely Rwanda Energy Access and Quality Improvement Project (EAQIP)” financed by World Bank and is expected to be co-financed by AFD (joint co-financing), the OFID (parallel co-financing), SFD (parallel), and the Korean Fund for International Development (parallel); Rwanda Transmission System Reinforcement and Last Mile Connectivity to be financed by AfDB and which will be financed by EIB under parallel financing.

Electrification projects (Power plants for power generation, Transmission and Distribution lines fall under the activities which require full Environment and Social Impact Assessment (ESIA) prior to implementation. Thus, Rwanda Energy Development Corporation Limited which is implementing Rwanda Access Rwanda Universal Energy Access Program wants to conduct Environmental and Social Impact Assessment for the proposed subproject of design, Supply, and Installation of Low Voltage and Medium Voltage Lines and Service Connections in the following eastern Province- EPCs East.

2. DESCRIPTION OF PROJECT AND ACTIVITIES

The project of design, Supply, and Installation of Low Voltage and Medium Voltage Lines and Service Connections in the following Eastern Province- EPCs East, will be implemented across all seven District in eastern Province namely Nyagatare, Gatsibo, Kayanza, Kirehe, Rwamagana, Ngoma, and Bugesera. The project objective is to improve access to energy and efficiency of energy service delivery to households, businesses, and public institutions in Rwanda. This objective will be achieved through upgrading and extension of different MV and LV lines for improved supply, improving Quality of Power Supply in Distribution System and upgrade of single to three phase lines in these districts.

During design phase and planning phase planned activities will consist of surveying and mapping new transmission and distribution routes and site selection to minimize Environmental and Social Risks and Impacts to avoid harming sensitive ecosystems. During the implementation phase key activities will include clearing of the Right of Way (ROW) equivalent to 12m wide, foundation excavations and erection of poles, installation of transformers along the transmission path for stepping down the electricity from MV to LV before distributing to consumers. This electrification project will involve the construction and rehabilitation of aerial MV electrical lines three phase that can be transformable for future industrial zones and three phase for reinforcement of already electrified zones.

3. SCOPE OF THE ASSIGNMENT

This assessment will cover all project phases from design, supply, and installation of MV and LV line and associated distributions structures and will cover all districts in Western Province. The present study will consist of collecting and analysing available data using appropriate techniques to achieve the goals of this consultancy. It will come up with realistic proposals and recommendations after consultations with Ministry of Environment (MoE) and its agencies, Rwanda Development Board (RDB), REMA, REG/EDCL SPIU, District authorities and local communities.

The ESIA study team will also provide a site specific environmental and social management plan including, health and Safety plan that:

- Prescribes mitigation measures needed to ensure long-term project sustainability, including institutional capacity building for environmental management at all levels, public safety measures during construction and operational phases, and,
- Outlines indicators and sets up a monitoring program to track agricultural and environmental and social performance of the target watersheds and implementation of the mitigation measures for the refinement of future management action as required.

REPORTING REQUIREMENT AND ESIA CONTENTS

The terms of reference discussed here are set for developer and the funder satisfaction and should not hinder the firm of experts to follow the recommendation provided by RDB after scoping. These ToRs given by RDB should be strictly followed to get the certificate and comply with ESIA regulations in Rwanda. The firm of experts should make sure that every point in this content is tackled at its fullest satisfaction to the client (EDCL), RDB, development partners and other stakeholders. The following format is suggested, and the ESIA report should contain but not limited to the following key points:

Executive Summary:

- Name and location of the project,
- Name of the developer,
- Name of agency preparing the report,
- Main impacts identified,
- Mitigation recommendations,

Environmental and social monitoring plan.

Introduction:

- Author presentation,
- Developer presentation.
- Objectives of the project.
- Objective of the study.
- Methodology used for the study.

Legislative and Regulatory Consideration:

The firm of experts shall describe the relevant regulations and standards of international, national, regional and local levels that govern environmental and social quality including but not limited to : workers and population health and safety, solid and liquid wastes management, protection of sensitive areas and endangered species, biodiversity conservation, land use control, construction of electrical infrastructure standards or guidelines, resettlement and expropriation, public consultation and information disclosure, etc. The firm of experts will then determine their relevance to the project and identify associated compliance issues. The firm of experts will identify and assess the environmental and social requirements of the funding institution taking into consideration their relevance to the project.

Baseline data: Summary of information on the status of the location

- Project description,
- Location, description of the current use of the location, project size,
- Detailed description of the project, extend in time and space,
- The firm of experts shall document the existing conditions before the project comes into being. These include (i) Physical conditions of topography (soil, climate, hydrology, etc.), (ii) Biological conditions on the status of the flora and fauna, (iii) Chemical state such as the pollution status of the area for air, soil, water bodies, and (iv) socio-economic status of the project locality, including population size, structure and distribution, income, health status, and infrastructure.

Description of prevention and security measures during the site preparation and exploitation phases.

e) Identification and analysis of potential environmental and social impacts of the project and corresponding mitigation measures

The firm of experts will assess the potential significant impacts or changes expected due to the proposed projects during construction and operation phases. These would entail environmental, ecological, and social impacts, both positive and negative which would result from interaction between the project activities and the environment that are likely to bring about changes in the baseline environmental, ecological, and social conditions discussed.

The firm of experts will perform the tasks below to identify and concisely present the significant environmental and social impacts:

- Explain and justify the methods used to predict potential impacts of the proposed projects on the environment, and on interactions among the project's components.
- Nominate and classify issues that are potentially important in the assessment of impacts and for decision-making in relation to the proposed projects'
- Identify and quantify potential impacts in the construction and operation phases by conducting an impact analysis on the physical, biological, land-use and socio-economic environments, and the interactions among them.
- Assess occupational health and safety risks and impacts during construction and operation phases and propose recommendations on corrective and remedial measures to be implemented.
- Evaluate the impact significance of the project components and activities on the environment and local community.
- Establish that criteria on which the assessment of the impacts will be based on
- Develop a matrix as a means to present assessment of the significant impacts graphically, and specify and discuss positive or negative impacts, direct or indirect impacts, reversible or irreversible impacts, short-term and long-term, and cumulative impacts on the environment and community.
- The firm of experts shall propose mitigation measures and realistic associated implementation costs for each of the identified impact. They will have to justify the basis of the proposed mitigation measures costs. This will serve as a useful reference and basis of the project Environmental and Social Management Plan (ESMP) during construction and operation phases.

Analysis of alternatives:

The firm of experts will systematically compare feasible alternatives to the proposed project site, technology, design, and operation including the "without project" situation in terms of their potential environmental and social impacts.

Assesses the alternatives' feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of alternative mitigation measures, and their suitability under local conditions; the institutional, training, and monitoring requirements for the alternative mitigation measures. When describing the impacts, the firm of experts will indicate which are irreversible or unavoidable and which can be mitigated. Try to quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures.

For each of the alternatives, quantifies the environmental and social impacts to the extent possible, and attaches socio-economic values where feasible.

Mitigation plan:

- Identification and description of environmental adverse impacts and effects of the project,
- Detailed description mitigation and compensation measures proposed
- Plans, equipment, and operational procedures appropriate to respond to these impacts.

(a) Environmental and Social Management Plan (ESMP):

- Detailed description of the modalities provided in the project for the implementation of the proposed mitigation measures to its potential negative impacts including a tentative implementation budget and responsible stakeholders.
- The firm of experts shall propose a plan of actions and indicators to monitor the implementation of the proposed mitigation measures during the construction and operation phases of the project. The firm of experts is required to give specific descriptions and technical details of monitoring measures including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, definition of thresholds that will signal the need for corrective actions, and monitoring and reporting procedures. The firm of experts will provide time frames and implementation mechanisms, staffing requirements and cost outlays for successful implementation of the plan.

(b) Conclusions and Recommendations:

The report should also include all information necessary to the project review such as lists of data sources, project background reports and studies, and any other relevant information to which the firm of experts' attention should be directed.

(c) Appendices must include:

- References—setting out the written materials both published and unpublished, that have been used scientifically.
- Record of consultations, and surveys with stakeholders,
- List of associated reports or plans.

4. STUDY TEAM AND REQUIRED EXPERTISE

The Client has hired the Bureau for Engineering and Environmental Studies/BESST Ltd to conduct this ESIA. BESST LTD is registered under Rwanda Association of Professional Environmental Practitioners (RAPEP) at level of firm of experts and has vast experience in preparing ESIA proven by at least five (5) EIA completion Certificates have worked on different ESIA's for energy development projects funded by international development partners.

BESST will avail the following key Personnel with indicated Qualifications and Experience.

S/N	Key personnel	Desired Qualifications and Experience
1.	Environmental (Team Leader)	- At least Master's degree from a Recognized Academic Institution in Environmental sciences, Environmental Management, Natural Resources Management, Environmental Engineering and related fields with at least 5 years of practice/experience in the environment field/studies or bachelor's degree from Recognized Academic Institution in Environmental sciences, Environmental Management, Natural Resources Management, Environmental Engineering and related fields with at least 10 years of practice/experience in the environmental field/studies. - To have conducted at least 3 EIAs, proven by service completion certificates and copy of RDB EIA certificates of approval. - Must be registered in RAPEP as Lead Expert or Associate Expert, proven by a valid RAPEP certificate.

		- To have worked on at least 2 international donor funded projects such as the World Bank, African Development Bank, European Investment Bank etc proved by 1 completion certificate.
2.	Social Scientist	- At least Master's degree from a Recognized Academic Institution in Social Sciences or related fields with at least 5 years of experience in social sciences or bachelor's degree from Recognized Academic Institution in Social Sciences with at least 10 years of experience in the Social Sciences and related fields such as gender studies. - To have participated in preparation of at least 3 ESIA's, proven by service completion certificates. - To have worked on at least 1 international donor funded projects such as the World Bank, African Development Bank, European Investment Bank etc proved by 1 completion certificates.
3.	Electrical Engineer	- Bachelor's degree from Recognized Academic Institution in Electrical Engineering with at least 5 years of experience working in the implementation of energy projects such as construction of transmission, distribution and access lines. - Must be registered at the national institution of engineers or other recognized foreign institutions (proven by membership certificates) -He/She must have a certificate of License (category) Z in electrical installation issued by RURA.
4.	Civil Engineer	- Bachelor's degree from Recognized Academic Institution in Civil Engineering with at least 5 years of experience working in the implementation of energy projects such as construction of transmission, distribution and access lines. - Must be registered at the national institution of engineers or other recognized foreign institutions (proven by membership certificates)
5.	Health and Safety expert	- Bachelor's degree from Recognized Academic Institution in Environmental health sciences or related fields with at least 5 years of experience working in the implementation of energy projects such as construction of transmission, distribution and access lines. - To have worked on at least 2 international donor funded infrastructure projects such as the World Bank, African Development Bank, European Investment Bank
6.	Surveyor	- Bachelor's degree from Recognized Academic Institution in Surveying and Geomatics Engineering with at least 5 years of experience in the field of Environmental and Social studies. - Must be a member of national association of surveyors.

Annex 2: Environmental and Social Management and Monitoring Plan for Bugesera District

Environmental and Social Management Plan for Bugesera District

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
Design and Construction Phase					
Environmental and Social risk management	Lack of qualified environmental and social risks experts and E&S instruments for contractor and supervising engineer	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor & supervising firm	Under the cost of EPC's contract ⁶
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of crops, trees and assets along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	30,000 ⁷
	PAPs complaints about their	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC	13,000*

⁶ One EPC Contractor for two districts was considered. For the entire project in Eastern Province, the cost under environmental and social management will be covered under EPC and not by district

⁷ Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV)

*: Estimates are based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	assets affected by survey team			Contractor and District, Districts	
	Disruption of agricultural activities and land use restriction under RoW	- All crops trees and trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops, - Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determined by RAP budget
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of vegetation cover in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees and Crops should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.	During site clearance	REG-EDCL/ /District REG-EDCL/ Contractor, Districts	To be included in EPC contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. - 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.	During design and Site clearance	EPC contractor	Under the cost of project Mobiliza

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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 reptiles 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 not 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. - Reforestation where possible to offset loss of flora and fauna			tion and Operational Budget
Recruitment and employment	Labor influx/Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, District labour inspector/	12,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff. - Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct	Ongoing	REG/EDCL , Supervising Engineer, EPC Contractor, Health Centers, Districts, Isange One stop center	10,000*
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall be regularly 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	Ongoing	REG/EDCL , Supervising Engineer, EPC Contractor, Health Centers, Districts,	15,000*
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL , Supervising Engineer, EPC	Under Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
				Contractor, Districts,	
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda; - Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	5,000*
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operatio nal Budget
	Health and Safety issues	- 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.	Ongoing	EPC contractor, Supervising engineer /district	Operatio nal Budget 3,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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; - 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			
	Loss of on Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure"; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas. - Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”. - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area	Ongoing	EPC contractor, Supervising engineer	Operatio nal Budget
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works;	Ongoing	EPC contractor, Supervising engineer	Constric tion budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Location of staging areas on steep gradients should be avoided to prevent increased erosion. - All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes			
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, non biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A).	Ongoing	EPC contractor, Supervising engineer	Construction budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
		- If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance			
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	5,000*
	Oil spillage	- 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;	Ongoing	EPC contractor, Supervising engineer	Constriction budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
Poles erection, Stringing works, line energising and installation of transformers	Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure	- 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. - More details are included in Occupational health and safety	Ongoing	EPC contractor, Supervising engineer	Operatio nal budget
	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.	Ongoing	REG-EDCL/Cont ractor and Districts	Constru ction budget
Operational & Maintenance Phase					
Maintenanc e of electrical principal	Theft of equipment and Vandalism of power	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure;	Ongoing	REG-EDCL, District	Operatio nal Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
equipment and Power Distribution through the proposed line	distribution infrastructure	- Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, staging areas, and during materials transportation; - The security firms will be screened and references sought			
	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way; - Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)	Ongoing	REG-EDCL, District	Operatio nal Budget
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operatio nal Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operatio nal Budget
	Fire accidents due to inappropriate power usage	- A robust fire prevention program and fire suppression system should be developed by the contactor for use in each cabin.	Ongoing	REG-EDCL, District	Operatio nal Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
		- All of the cabins 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. - 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			
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operatio nal Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operatio nal Budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in pace all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained	Regulatory	REG-EDCL	Operatio nal budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsib le for implement ation	Budget (USD)
		- Establish and communicate regular maintenance plans			
Decommissioning Phase					
Removal and disposal of electrical cables, poles and transformers	Waste generation and inappropriate storage of electric equipment's	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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. - 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. - Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).	Once	REG-EDCL, EPC contractor	Decom missioni ng budget
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decom missioni ng budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions;	Once	REG-EDCL, EPC contractor	Decom missioni ng budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles			ng budget
Total budget					93,000

Environmental and Social Monitoring plan of Bugesera district

Environmental and Social Monitoring plan of Bugesera district

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Securing of the RoW	Fair compensation for affected crops, trees and	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook Project area	Regular	Districts local authorities/ PAPs	32,580 ⁸
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /District local traffic police	no cost required for recording
Labor influx	Number of workers hired from the community	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor / supervisor	Budgeted for under ESMP

⁸Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor supervisor /	No cost required for recording
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor supervisor /	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV Number of workers signed COC Availability of SEA/SH suitable grievance mechanism	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	During project works	Contractor/ supervisor	300 for noise measurement
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	As appropriate	Contractor/ traffic police	750 for automobile certification
Soil erosion	Presence of soil erosion barriers at the project sites	Soil erosion and Turbidity in storm water	Daily	EDCL/ District	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	regular	EDCL/ District	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	After project implementation	Locals /local authorities /EDCL/ Districts	cost for restoration to be included in project construction budget
Working conditions	Occupational health and Safety	Availability at site of OHS Plan	Permanent	EDCL/ District	Cost covered during the preparation of OHS plan

	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ district	5,000 for MoU signed between district hospital
	Incidents and accidents at the project site	Presence of warning and reminding sign posts at the site	daily	Districts/ EDCL	Cost for signposts covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	daily	EDCL/ Districts district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ DISTRICTS District	300 to cater for sanitation facilities in district
Child and forced labor	Minimum working age and working condition	Employment record by age	regular	EDCL /Local authorities/ project workers/ local population	No cost is required
Treeremoval (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	Once	EDCL / Contractor/ Districts	700
Operation phase					
Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ Districts district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					72,870

Annex 3: Environmental and Social Management and Monitoring Plan for Gatsibo District

Environmental and Social Management Plan for Gatsibo District

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
Design and Construction Phase					
Environmen tal and Social risk manageme nt	Lack of qualified environmental and social risks experts and E&S instruments for contractor and supervising engineer	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor &supervising firm	Under the cost of EPC's contract ⁹
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width	Loss of crops , trees and other assets along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	36,000 ¹⁰

⁹ One EPC Contractor for two districts was considered. The cost under environmental and social management will be covered under EPC and not by district

¹⁰ Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV)

*: Estimates are done based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
of Right of Way	PAPs complaints about their assets affected by survey team	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC Contractor and District, Districts	16,000*
	Disruption of agricultural activities and land use restriction under RoW	- All crops, trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops, - Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determined by RAP budget
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of vegetation cover in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.	During site clearance	REG-EDCL/ /District REG-EDCL/ Contractor, Districts	To be included in EPC contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation.	During design and	EPC contractor	Under the cost of project

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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 reptiles 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 not 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.	Site clearance		Mobilization and Operational Budget
Recruitment and employment	Labor influx/Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, District labour inspector/	15,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall 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; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff. - Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts, Isange One stop center	12,000*
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall 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	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	18,000*
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Under Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda; - Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	6,000*
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operatio nal Budget
	Health and Safety issues	- 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;	Ongoing	EPC contractor, Supervising engineer /district	Operatio nal Budget 4,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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; - 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			
	Loss of on Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure"; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas.	Ongoing	EPC contractor,	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”. - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area		Supervising engineer	
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes			
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, no biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	6,000*
	Oil spillage	- 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 refilling and maintenance should be done with qualified and experienced personnel;	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
Poles erection, Stringing works, line	Fall and trip hazards for workers and passers-by	- 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;	Ongoing	EPC contractor, Supervising engineer	Operatio nal budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
energising and installation of transformers	during mounting of strength electric equipment and Risk of poles failure	- 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. - More details are included in Occupational health and safety			
	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.	Ongoing	REG-EDCL/Contractor and Districts	Construction budget
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution through the	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure; - Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, , staging areas, and during materials transportation; - The security firms will be screened and references sought	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
proposed line	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way; - Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)	Ongoing	REG-EDCL, District	Operational Budget
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operational Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operational Budget
	<u>Fire accidents due to inappropriate power usage</u>	- A robust fire prevention program and fire suppression system should be developed by the contractor for use in each cabin. - All of the cabins 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.	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- 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			
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operatio nal Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operatio nal Budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regulatory	REG-EDCL	Operatio nal budget
Decommissioning Phase					
Removal and disposal of electrical cables,	Waste generation and inappropriate storage of	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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.	Once	REG-EDCL, EPC contractor	Decommi ssioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
poles and transformers	electric equipment's	- 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. - Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).			
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles	Once	REG-EDCL, EPC contractor	Decommissioning budget
Total					113,000

Environmental and Social Monitoring Plan of Gatsibo district

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Securing of the RoW	RAP prepared Fair and full compensation for affected crops, trees	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP for district
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook Project area	Regular	Districts local authorities/ PAPs	39,510 ¹¹
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /Districts local traffic police	no cost required for recording
Labor influx	Number of workers for the project	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor supervisor /	Budgeted for under ESMP
	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor supervisor /	No cost required for recording
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor supervisor /	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	during project works	Contractor/ supervisor	300 for noise measurement

¹¹ Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	As appropriate	Contractor/ traffic police	750 for automobile certification
Soil erosion	Presence of soil erosion barriers at the project sites	Soil erosion and Turbidity in storm water	Daily	EDCL/ Districts	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	Regular	EDCL/ Districts	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	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	Permanent	EDCL/ Districts	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ districts	5,000 for MoU signed between district hospital
	Incidents and accidents at the project site	Presence of warning and reminding sign posts at the site	Daily	Districts/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	Daily	EDCL/ Districts district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ DISTRICTS District	300 to cater for sanitation facilities
Child and forced labor	Minimum working age and working condition	Employment record by age	regular	EDCL /Local authorities/ project workers/ local population	No cost is required

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Treeremoval (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	Once	EDCL / Contractor/ Districts	700
Operation phase					
Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ Districts district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					48,800

Annex 4: Environmental and Social Management and Monitoring Plan for Kayonza District

Environmental and Social Management Plan for Kayonza District

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementation	Budget (USD)
Design and Construction Phase					
Environmental and Social risk management	Lack of qualified environmental and social risks experts and E&S instruments for contractor and supervising engineer	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor &supervising firm	Under the cost of EPC's contract ¹²

¹² One EPC Contractor for two districts was considered. The cost under environmental and social management will be covered under EPC and not by district

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of crops, trees along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	23,000 ¹³
	PAPs complaints about their assets affected by survey team	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC Contractor and District, Districts	10,000*
	Disruption of agricultural activities and land use restriction under RoW	- All crops, assts and trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops, - Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determined by RAP budget
Clearing all vegetation, felling trees in 6m width	Loss of vegetation cover in in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern	During site clearance	REG-EDCL/ /District REG-EDCL/ Contractor, Districts	To be included in EPC contrac

¹³ Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV in Eastern Province

*: Estimates are done based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
of Right of Way		- 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.			t's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. - 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 reptiles 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.	During design and Site clearance	EPC contractor	Under the cost of project Mobilization and Operational Budget
Recruitment and employment	Labor influx/ Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall 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;	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers,	9,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff		District labour inspector/	
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff. - Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts, Isange One stop center	8,000*
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall be regularly sensitized on ways of HIV/AIDS contamination and prevention and other communicable diseases; - Toolbox 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	11,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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			
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Under Operational Budget
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda; - Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	4,000*
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Health and Safety issues	- Avoid excavation works in areas with loose materials in extremely dry weathers to prevent dust;	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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 neighborhood; - 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; - 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			2,000*
	Loss of Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure";	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.			
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas. - Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”. - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area	Ongoing	EPC contractor, Supervising engineer	Operational Budget
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site;	Ongoing	EPC contractor, Supervising engineer	Construction budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion. - All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes			
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, no biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided.	Ongoing	EPC contractor, Supervising engineer	Construction budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance			
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	4,000*
	Oil spillage	- 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 refilling and maintenance should be done with qualified and experienced personnel;	Ongoing	EPC contractor, Supervising engineer	Construction budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
Poles erection, Stringing works, line energising and installation of transformers	Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and Risk of poles failure	- 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. - More details are included in Occupational health and safety	Ongoing	EPC contractor, Supervising engineer	Operational budget
	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.	Ongoing	REG-EDCL/Contractor and Districts	Construction budget
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure;	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
through the proposed line		- Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, staging areas, and during materials transportation; - The security firms will be screened and references sought			
	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way; - Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)	Ongoing	REG-EDCL, District	Operational Budget
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operational Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operational Budget
	Fire accidents due to inappropriate power usage	- A robust fire prevention program and fire suppression system should be developed by the contractor for use in each cabin. - All of the cabins 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.	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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. - 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			
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regularly	REG-EDCL	Operational budget
Decommissioning Phase					
Removal and	Waste generation and	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works.	Once	REG-EDCL, EPC contractor	Decommissioning

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
disposal of electrical cables, poles and transformers	inappropriate storage of electric equipment's	- 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. - 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. - Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).			ning budget
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties	Once	REG-EDCL, EPC contractor	Decommissioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles			
Total					71,000

Environmental and Social Monitoring Plan of Kayonza district

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Securing of the RoW	Fair compensation for affected crops, trees	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP for district
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook Project area	Regular	District local authorities/ PAPs	25,020 ¹⁴
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /Districts local traffic police	no cost required for recording
Labor influx	Number of workers for the project	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor supervisor /	Budgeted for under ESMP
	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor supervisor /	No cost required for recording

¹⁴ Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor supervisor /	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	during project works	Contractor/supervisor	300 for noise measurement
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	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	Daily	EDCL/ District	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	regular	EDCL/ Districts	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	After project implementation	Locals /local authorities /EDCL/ District	cost for restauration to be included in project construction budget
Working conditions	Occupational health and Safety	Availability at site of OHS Plan	Permanent	EDCL/ District	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ district	5,000 for MoU signed between district hospital
	Incidents and accidents at the project site	Presence of warning and reminding sign posts at the site	daily	District/ EDCL	Cost for sign post covered under construction budget

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	daily	EDCL/ District district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ DISTRICTS District	300 to cater for sanitation facilities
Child and forced labor	Minimum working age and working condition	Employment record by age	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	Once	EDCL / Contractor/ Districts	700
Operation phase					
Effets from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ District district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					34,310

Annex 5: Environmental and Social Management and Monitoring Plan for Kirehe District

Environmental and Social Management Plan for Kirehe District

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
Design and Construction Phase					
Environmental and Social risk management	Lack of qualified environmental and social risks experts and E&S instruments for contractor and supervising engineer	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor &supervising firm	Under the cost of EPC's contract ¹⁵
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width	Loss of crops, asstes and trees along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	39,000 ¹⁶

¹⁵ One EPC Contractor for two districts was considered. The cost under environmental and social management will be covered under EPC and not by district

¹⁶ Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV in Eastern Province

*: Estimates are done based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
of Right of Way	PAPs complaints about their assets affected by survey team	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC Contractor and District, Districts	17,000*
	Disruption of agricultural activities and land use restriction under RoW	- All crops and trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops, - Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determined by RAP budget
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of vegetation cover in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees and Crops should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.	During site clearance	REG-EDCL/ /District REG-EDCL/ Contractor, Districts	To be included in EPC contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation.	During design and	EPC contractor	Under the cost of

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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 reptiles 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 not 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.	Site clearance		project Mobilization and Operational Budget
Recruitment and employment	Labor influx/ Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, District labour inspector/	16,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff. - Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts, Isange One stop center	13,000*
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall be regularly 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	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	19,000*
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Under Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda; - Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	7,000*
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Health and Safety issues	- 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;	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget 4,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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; - 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			
	Loss of on Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure"; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas.	Ongoing	EPC contractor,	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”. - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area		Supervising engineer	
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion.	Ongoing	EPC contractor, Supervising engineer	Construction budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes			
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, non biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance	Ongoing	EPC contractor, Supervising engineer	Construction budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided	Ongoing	EPC contractor, Supervising engineer	Construction budget
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	7,000*
	Oil spillage	- 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 refilling and maintenance should be done with qualified and experienced personnel;	Ongoing	EPC contractor, Supervising engineer	Construction budget
Poles erection, Stringing works, line	Fall and trip hazards for workers and passers-by	- 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;	Ongoing	EPC contractor, Supervising engineer	Operational budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
energising and installation of transformers	during mounting of strength electric equipment and Risk of poles failure	- 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. - More details are included in Occupational health and safety			
	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.	Ongoing	REG-EDCL/Contractor and Districts	Construction budget
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution through the	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure; - Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, staging areas, and during materials transportation; - The security firms will be screened and references sought	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
proposed line	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way; - Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)	Ongoing	REG-EDCL, District	Operational Budget
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operational Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operational Budget
	Fire accidents due to inappropriate power usage	- A robust fire prevention program and fire suppression system should be developed by the contractor for use in each cabin. - All of the cabins 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.	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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			
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regulatory	REG-EDCL	Operational budget
Decommissioning Phase					
Removal and disposal of electrical cables,	Waste generation and inappropriate storage of	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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.	Once	REG-EDCL, EPC contractor	Decommissioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
poles and transformers	electric equipment's	- 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. - Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).			
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles	Once	REG-EDCL, EPC contractor	Decommissioning budget
Total					122,000

Environmental and Social Monitoring Plan of Kirehe district

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Securing of the RoW	Fair compensation for affected crops, trees	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP for district
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook Project area	Regular	District local authorities/ PAPs	42,390 ¹⁷
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /Districts /local Traffic police	no cost required for recording
Labor influx	Number of workers for the project	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor / supervisor	Budgeted for under ESMP
	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor / supervisor	No cost required for recording
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor / supervisor	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP

¹⁷ Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	during project works	Contractor/ supervisor	300 for noise measurement
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	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	Daily	EDCL/ District	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	regular	EDCL/ Districts	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	After project implementation	Locals /local authorities /EDCL/ District	cost for restauration to be included in project construction budget
Working conditions	Occupational health and Safety	Availability at site of OHS Plan	Permanent	EDCL/ District	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ district	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	daily	District/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	daily	EDCL/ District district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ DISTRICT District	300 to cater for sanitation facilities

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Child and forced labor	Minimum working age and working condition	Employment record by age	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	Once	EDCL / Contractor/ District	700
Operation phase					
Effets from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ District district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					51,680

Annex 6: Environmental and Social Management and Monitoring Plan for Ngoma District

Environmental and Social Management Plan for Ngoma District

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
Design and Construction Phase					
Environmen tal and Social risk managemen t	Lack of qualified environmental and social risks experts and E&S instruments for	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is	Ongoing	EPC contractor Supervising engineer	Under the cost of EPC's contract ¹⁸

¹⁸ One EPC Contractor for two districts was considered. The cost under environmental and social management will be covered under EPC and not by district

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	contractor and supervising engineer	provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.		Contractor & supervising firm	
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of crops and trees along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	13,000 ¹⁹
	PAPs complaints about their assets affected by survey team	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC Contractor and District, Districts	6,000*
	Disruption of agricultural activities and land use restriction under RoW	- All crops , trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops,	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determined by RAP budget

¹⁹ Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV in Eastern Province

*: Estimates are done based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.			
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of vegetation cover in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees and crops should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.	During site clearance	REG-EDCL/ District REG-EDCL/ Contractor, Districts	To be included in EPC contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. - 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 reptiles 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	During design and Site clearance	EPC contractor	Under the cost of project Mobilization and Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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.			
Recruitment and employment	Labor influx/ Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall 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; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, District labour inspector/	5,000*
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall 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; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	4,000*

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct		Isange One stop center	
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall 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	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	7,000*
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Under Operational Budget
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda;	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	2,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.			
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Health and Safety issues	- 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;	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget 1,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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			
	Loss of on Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure"; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas. - Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as "Men at Work" or "Work in Progress" or "trucks turning". - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area	Ongoing	EPC contractor, Supervising engineer	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion. - All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, no biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions;	Ongoing	EPC contractor, Supervising engineer	Constriction budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided			
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	2,000*
	Oil spillage	- 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 refilling and maintenance should be done with qualified and experienced personnel;	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
Poles erection, Stringing works, line energising and installation of	Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and	- 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;	Ongoing	EPC contractor, Supervising engineer	Operatio nal budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
transformers	Risk of poles failure	- 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. - More details are included in Occupational health and safety			
	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.	Ongoing	REG-EDCL/Contractor and Districts	Construction budget
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution through the proposed line	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure; - Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, staging areas, and during materials transportation; - The security firms will be screened and references sought	Ongoing	REG-EDCL, District	Operational Budget
	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way;	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)			
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operatio nal Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operatio nal Budget
	Fire accidents due to inappropriate power usage	- A robust fire prevention program and fire suppression system should be developed by the contactor for use in each cabin. - All of the cabins 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. - 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	Ongoing	REG-EDCL, District	Operatio nal Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regulatory	REG-EDCL	Operational budget
Decommissioning Phase					
Removal and disposal of electrical cables, poles and transformers	Waste generation and inappropriate storage of electric equipment's	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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. - 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.	Once	REG-EDCL, EPC contractor	Decommissioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).			
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles	Once	REG-EDCL, EPC contractor	Decommissioning budget
Total					40,000

Environmental and Social Monitoring Plan of Ngoma district
Environmental and Social Monitoring Plan of Ngoma district

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Securing of the RoW	RAP Prepared Full and Fair compensation for affected crops, trees and	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP for each district
	No of complaints associated to the transmission electrical cables located nearby residential houses addressed	GRM logbook Project area	Regular	Districts local authorities/ PAPs	14,400 ²⁰
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /Districts local traffic police	no cost required for recording
Labor influx	Number of workers hired from the community	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor / supervisor	Budgeted for under ESMP
	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor / supervisor	No cost required for recording
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor / supervisor	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV Number of workers signed COC Number of SEA/SH trainings	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	during project works	Contractor/ supervisor	300 for noise measurement in each district

²⁰ Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	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	Daily	EDCL/ District	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	regular	EDCL/ District	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	After project implementation	Locals /local authorities /EDCL/ District	cost for restauration to be included in project construction budget
Working conditions	Occupational health and Safety	Availability at site of OHS Plan	Permanent	EDCL/ District	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ district	5,000 for MoU signed between district hospital
	Incidents and accidents at the project site	Presence of warning and reminding sign posts at the site	daily	District/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	daily	EDCL/ District district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ DISTRICTS District	300 to cater for sanitation facilities
Child and forced labor	Minimum working age and working condition	Employment record by age	regular	EDCL authorities/ workers/ population /Local project local	No cost is required

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Treeremoval (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	Once	EDCL / Contractor/ Districts	700
Operation phase					
Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ District district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					23,690

Annex 7: Environmental and Social Management and Monitoring Plan for Nyagatare District

Environmental and Social Management Plan for Nyagatare District

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementation	Budget (USD)
Design and Construction Phase					
Environmental and Social risk management	Lack of qualified environmental and social risks experts and E&S instruments for contractor and	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor &supervising firm	Under the cost of EPC's contract ²¹

²¹ One EPC Contractor for two districts was considered. The cost under environmental and social management will be covered under EPC and not by district

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
	supervising engineer				
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of crops ,trees and other assets along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	119,000 ²²
	PAPs complaints about their assets affected by survey team	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC Contractor and District, Districts	52,000*
	Disruption of agricultural activities and land use restriction under RoW	- All crops ,trees and that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops,	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determin ed by RAP budget

²² Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV in Eastern Province

*: Estimates are done based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.			
Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of vegetation cover in in the right of way and poles foundations.	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible; - Clearing of trees should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.	During site clearance	REG-EDCL/ /District REG-EDCL/ Contractor, Districts	To be included in EPC contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. - 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 reptiles 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	During design and Site clearance	EPC contractor	Under the cost of project Mobilizati on and Operatio nal Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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.			
Recruitment and employment	Labor influx/ Labour issues and employee conduct	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, District labour inspector/	48,000*
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	40,000*

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct		Isange One stop center	
	Possible increases of HIV/AIDS and other communicable	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour; - All project workers shall 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	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts,	60,000*
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Under Operational Budget
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda;	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	20,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.			
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Health and Safety issues	- 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;	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget 12,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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			
	Loss of on Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner. - Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a "chance finds procedure"; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas. - Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as "Men at Work" or "Work in Progress" or "trucks turning". - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area	Ongoing	EPC contractor, Supervising engineer	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas. - 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion. - All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, no biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions;	Ongoing	EPC contractor, Supervising engineer	Constriction budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided			
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	20,000*
	Oil spillage	- 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 refilling and maintenance should be done with qualified and experienced personnel;	Ongoing	EPC contractor, Supervising engineer	Constricti on budget
Poles erection, Stringing works, line energising and installation of	Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and	- 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;	Ongoing	EPC contractor, Supervising engineer	Operatio nal budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
transformers	Risk of poles failure	- 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. - More details are included in Occupational health and safety			
	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.	Ongoing	REG-EDCL/Contractor and Districts	Construction budget
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution through the proposed line	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure; - Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, staging areas, and during materials transportation; - The security firms will be screened and references sought	Ongoing	REG-EDCL, District	Operational Budget
	Health and safety issues due to Electric and magnetic field	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines; - Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way;	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)			
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operational Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operational Budget
	Fire accidents due to inappropriate power usage	- A robust fire prevention program and fire suppression system should be developed by the contractor for use in each cabin. - All of the cabins 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. - 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	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regulatory	REG-EDCL	Operational budget
Decommissioning Phase					
Removal and disposal of electrical cables, poles and transformers	Waste generation and inappropriate storage of electric equipment's	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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. - 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.	Once	REG-EDCL, EPC contractor	Decommissioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).			
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decommi ssioning budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles	Once	REG-EDCL, EPC contractor	Decommi ssioning budget
	Total budget				371,000
TOTAL				138,890	

Environmental and Social Monitoring Plan of Nyagatare district

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)

Pre-construction and project mobilization phase					
Securing of the RoW	Fair compensation for affected crops, trees and	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook Project area	Regular	District local authorities/ PAPs	129,600 ²³
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /District local traffic police	no cost required for recording
Labor influx	Number of workers for the project	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor supervisor /	Budgeted for under ESMP
	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor supervisor /	No cost required for recording
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor supervisor /	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV Number of workers signed COC Number of SEA/SA trainings provided	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	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	As appropriate	Contractor/ traffic police	750 for automobile certification

²³ Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

Soil erosion	Presence of soil erosion barriers at the project sites	Soil erosion and Turbidity in storm water	Daily	EDCL/ District	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	regular	EDCL/ District	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	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	Permanent	EDCL/ District	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ district	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	daily	District/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	daily	EDCL/ District district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ DISTRICTS District	300 to cater for sanitation facilities
Child and forced labor	Minimum working age and working condition	Employment record by age	regular	EDCL /Local authorities/ workers/ local population	No cost is required
Tree removal (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	Once	EDCL / Contractor/ Districts	700
Operation phase					

Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ District district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					138,890

Annex 8: Environmental and Social Management and Monitoring Plan for Rwamagana District

Environmental and Social Management Plan for Rwamagana District

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
Design and Construction Phase					
Environmen tal and Social risk manageme nt	Lack of qualified environmental and social risks experts and E&S instruments for contractor and supervising engineer	- Recruit and maintain a qualified environmental Expert, a social expert at contractor level; - Recruit and maintain a qualified environmental and social Expert for the supervising engineer for each district; - Preparation and implementation of Contractor Environmental and Social management Plans including at Minimum Occupational Health and Safety Plan (a general plan is provided in this ESIA), Waste Management Plan, Traffic Management Plan and site restoration plan etc.	Ongoing	EPC contractor Supervising engineer Contractor &supervising firm	Under the cost of EPC's contract ²⁴

²⁴ One EPC Contractor for two districts was considered. The cost under environmental and social management will be covered under EPC and not by district

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
Survey of ROW for medium and low voltage lines routes and Clearing all vegetation, felling trees in 6m width of Right of Way	Loss of crops , trees and along the Right of Way and Poles foundations	- Prepare and implement a resettlement plan once the right of Way is identified; - Project activities shall be implemented after harvest to avoid crops losses and damages; - Local community and project beneficiaries must be involved in survey activities to identify and locate such protect areas such as graves and cemeteries where applicable; - Priority in job allocation shall be given to the affected local people as an alternative income source to sustain their domestic requirements. - Limit clearance for access, installation work and maintenance to the necessary extent, mainly at pole locations. - 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	Before site works start	REG-EDCL/EPC Contractor and District, Districts	85,000 ²⁵
	PAPs complaints about their assets affected by survey team	- Establishment and operationalization of community Grievance Redress Mechanism	Ongoing	REG-EDCL/EPC Contractor and District, Districts	37,000*
	Disruption of agricultural activities and land use restriction under RoW	- All crops and trees that are likely to be affected by the proposed project shall be compensated for except those which are in the road reserve; - Notify local community on works schedule for not planting in areas to be affected but also to harvest mature crops, - Continuous sensitization of the communities through the District Authorities is recommended. There should be signed agreements between the Community and districts on restriction in the Right of Way.	Ongoing	REG-EDCL/EPC Contractor and District, Districts	To be determined by RAP budget
Clearing all vegetation, felling trees	Loss of vegetation cover in the right of	- Ensure the RoW is restricted as much as possible to the road reserve. - The power line RoW to be routed to avoid CFRs and species of conservation concern and commercial value where possible;	During site clearance	REG-EDCL/ /District REG-EDCL/	To be included in EPC

²⁵ Estimated based on other projects in eastern province (to be updated and included in RAP when final designs are approved (estimates at 830 USD per 1km of MV in Eastern Province

*: Estimates are done based on similar projects in Eastern Province and the length of the MV line to be constructed by district. The final cost shall be determined after project design approval)

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
in 6m width of Right of Way	way and poles foundations.	- Clearing of trees should be for only those that are more than 2 m high within the RoW, and the tall trees and branches adjacent the power lines that are of safety concern - 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 sloping areas and sensitive areas. - The wetlands, rivers, streams and areas that have surface water should be avoided and protected from earth works and contamination, and poles sited away from wet sections of the lines where possible. - All workers to be sensitized against unnecessary destruction, trampling and clearance of flora, blocking drainage and dumping wastes in swamps or water courses.		Contractor, Districts	contract's Budget
	Loss of flora and fauna species	- The sites clearance should be only done on an area demarcated for project activities; - To minimize the environmental impact, it is recommended that clearing be done manually as much as possible with no burning of the cleared vegetation. - 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 reptiles 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.	During design and Site clearance	EPC contractor	Under the cost of project Mobilization and Operational Budget
Recruitment and	Labor influx/ Labour issues	- Establish and operationalize Workers Grievance Redress Mechanism at all construction sites - Development and implementation of a Labor Management Plan	Ongoing	REG/EDCL, Supervising Engineer,	34,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
employment	and employee conduct	- Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management mechanism; - All workers to have contracts and time sheets for casual labourers; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly; - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff		EPC Contractor, Health Centers, District labour inspector/	
	Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	- Undertake training and awareness sessions for workers on SH, SEA, and GBV - Maximum effort shall be made to recruit locals who return to their home after work; - The contractor will be required to prepare and implement a code of conduct and each employee will sign it; - Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement - Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff. - Work with Existing GBV and Isange One Stop centers program to address GBV and SEA complaints - All workers will sign and comply with code of conduct	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Health Centers, Districts, Isange One stop center	28,000*
	Possible increases of HIV/AIDS and	- Contractor to have in place a worker's code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour;	Ongoing	REG/EDCL, Supervising Engineer, EPC	42,000*

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
	other communicable	- All project workers shall 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		Contractor, Health Centers, Districts,	
	Child labor, forced labour and discrimination.	- 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.	Ongoing	REG/EDCL, Supervising Engineer, EPC Contractor, Districts,	Under Operational Budget
Foundation works, excavation, and trenching	Injuries or fatalities from improper manual handling	- The entire project should be insured; - The contractor will establish health and safety measures that must be implemented at the project site by all workers; - Provision of appropriate Personnel Protective Equipment (PPE) to all employees; - Provide and avail permanent First aid kit at the work site; - Provide health insurance for all workers as means of health affordability; - Working conditions should respect the requirement of the Law n° 66/2018 of 30/08/2018 regulating labor in Rwanda; - Measures are taken to oblige workers to wear properly the PPEs and to properly manage generated waste to prevent any accidents during the construction works; - The safety plan and measure must be prepared and enforced at the project site; - Provide sign boards at the project site to prevent accidents and troubles involving site workers.	Ongoing	EPC contractor, Supervising engineer, REG-EDCL	14,000*

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Vandalism of construction material	- 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget
	Health and Safety issues	- 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; - 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	Ongoing	EPC contractor, Supervising engineer /district	Operational Budget 8,000*
	Loss of Physical and Cultural Resources	- At the local level, additional consultations will be carried out prior to commencement of works by the contractor, particularly on sites of cultural importance along the RoW. - Where cultural resources are encountered, compensation will be provided including support for relocation, such as graves, where applicable in a culturally acceptable manner.	Ongoing	EPC contractor, Supervising	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Excavation of sites of known archaeological importance should be avoided, and the routing of distribution lines should be designed to avoid graveyards or sites of historical or spiritual importance; - Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artefacts before commencement of work. Such training should be administered in liaison with district; - In the event of any chance finds of significance by the contractor, following the discovery of possible PCR, the Contractor will be required to follow a “chance finds procedure”; - The Contractor will be required to stop works and contact local Authority to inform the Department of Museums and Monuments. The Contractor should have the artefacts secured or protected, and prevent any access. - The museum and district authority will then undertake investigations, and works will only resume once authorization is provided.		engineer /district	
	Increased traffic in the project area	- Local traffic police will be involved for traffic monitoring; - Where possible speed limit and other traffic signs shall be installed especially in project working areas. - Traffic guides will be employed (flagmen) to control traffic; - Use of safety signage with labels such as “Men at Work” or “Work in Progress” or “trucks turning”. - Sensitize drivers on traffic management measures, good conduct while on public roads, and enforce speed limits for crew of up to 30 kph near construction sites; - Project vehicles will give the right of way to the local vehicles in the project area	Ongoing	EPC contractor, Supervising engineer	Operatio nal Budget
	Impacts on Soil, hydrology, water and ground water	- Siting of poles and transformers to avoid permanently and seasonally wet sections and water courses; change impacts; - 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 - Waste management during construction is crucial to prevent negative aesthetic impacts on the surroundings environment of the project areas.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- 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 fueling tankers other than fuel storage on sites - The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground - No hazardous materials (e.g. fuel or lubricant drums) will be stockpiled on site; - All vehicles to be checked for potential of oil leakages prior to works in wet sections of the line - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized, and sites restored after works; - Location of staging areas on steep gradients should be avoided to prevent increased erosion. - All vehicles and equipment to be serviced in designated areas, preferably at garages in urban Centers along the line routes			
	Increased risks of soil erosion	- During project works, contractor shall 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.	Ongoing	EPC contractor, Supervising engineer	Constricti on budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	Poor Solid waste management	- Waste management hierarchy (3 or 4Rs – reduce, reuse, recycle (and recover) which is an acceptable guide for prioritizing waste management practices should be considered; - Avoid or minimize the generation of waste materials, as far as practicable; - Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and; - Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner; - Use only waste handlers licensed by REMA to dispose of hazardous waste. - Provide adequate sanitary facilities for workers especially at staging areas; - Provide labelled waste bins at work sites for segregation of waste into biodegradable, no biodegradable and hazardous streams, and dispose appropriately; - Consider developing a waste management plan for proper solid waste management	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Noise and Vibration pollution	- No night-time works will be undertaken. - Activities with highest noise emissions will be undertaken at less sensitive times, especially near schools and health centers. - Vehicles delivering construction materials will be prohibited from waiting near sites with their engines running. The movement of heavy vehicles during the night will be avoided. - Where appropriate, noise barriers /attenuation will be employed to ensure that the maximum noise level at 1 m distance from a single source does not exceed 85 dB(A). - If particularly noisy works are scheduled, the nearest sensitive receptors (homestead owners, nearby schools, hospitals and retail shops) will be informed of the timing and duration of the nuisance	Ongoing	EPC contractor, Supervising engineer	Constriction budget
	Impact on Ambient air quality and air pollution	- Regular vehicle maintenance and confirmation of compliance with Ugandan emissions standards; - Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions;	Ongoing	EPC contractor, Supervising engineer	Constriction budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - Unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles; - Trucks transporting materials likely to emit dust will be well covered with appropriate material e.g. tarpaulins to prevent them from emitting dust; - All idle equipment or machinery will be turned off to minimize on gaseous emission; - Wherever possible, transport through densely populated areas should be avoided			
	Human waste disposal issues	- Put in place mobile toilets for use by workers during construction and ensure their periodic emptying by a licensed cesspool provider to any waste disposal designated facility - Workers should be made aware of the available sanitary facilities and trained on their use. - Ensure regular inspection of the worksite and the distribution line routes to identify sanitation non-conformances and ensure timely re-address. - Ensure that separate toilets are availed for both men and women and they should be well labelled	Ongoing	EPC contractor, Supervising engineer	14,000*
	Oil spillage	- 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 refilling and maintenance should be done with qualified and experienced personnel;	Ongoing	EPC contractor, Supervising engineer	Constrict on budget
Poles erection, Stringing works, line energising and installation of	Fall and trip hazards for workers and passers-by during mounting of strength electric equipment and	- 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;	Ongoing	EPC contractor, Supervising engineer	Operational budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
transformers	Risk of poles failure	- 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. - More details are included in Occupational health and safety			
	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.	Ongoing	REG-EDCL/Contractor and Districts	Construction budget
	Workers safety	- Provide adequate PPEs to all maintenance technicians and operator - Put in place all precautions to prevent electrocution - Ensure that operators and maintenance workers are adequately trained - Establish and communicate regular maintenance plans	Regulatory	REG-EDCL	Operational budget
Operational & Maintenance Phase					
Maintenance of electrical principal equipment and Power Distribution through the proposed line	Theft of equipment and Vandalism of power distribution infrastructure	- Sensitize the community through local radio projects and messages through places of worship (churches and mosques), and posters in public places on the negative effects of vandalizing electrical infrastructure; - Workers to be employed on site should be vetted or obtain reference letters by their respective village; - Contractor to engage a reputable security firm to provide security at sites, storage site, staging areas, and during materials transportation; - The security firms will be screened and references sought	Ongoing	REG-EDCL, District	Operational Budget
	Health and safety issues due to Electric	- Sensitization of communities to avoid activities and putting up developments along the right of way of the distribution lines;	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
	and magnetic field	- Sensitization of communities on electromagnetic fields, level of exposure and their impacts to avoid speculation; - Liaise with local authorities to ensure developments are not approved or occur within the right of way; - Evaluation of the potential exposure to EMF against the reference levels developed by International Commission on Non-Ionized Radiation Protection (ICNIRP)			
	Risk of bird collision	- Conductors along wetlands and in bird's migration areas will run horizontal not vertical. - Installation of visibility enhancement objects such as marker balls, bird deterrents or diverters	Ongoing	REG-EDCL, District	Operational Budget
	Pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Ongoing	REG-EDCL, District	Operational Budget
	Fire accidents due to inappropriate power usage	- A robust fire prevention program and fire suppression system should be developed by the contractor for use in each cabin. - All of the cabins 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. - Technical field personnel should report power outages to the REG-EDCL and repair faults quickly	Ongoing	REG-EDCL, District	Operational Budget

Activities	Description of Potential Impacts	Mitigations measures	Implementation schedule	Responsible for implementation	Budget (USD)
		- 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			
	Vandalism of the electrical cables and other structures	- 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	Ongoing	REG-EDCL, District	Operational Budget
	Disruption of electrical supply due to encroachment of the RoW and plantation of high trees under electrical lines	- 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	Ongoing	REG-EDCL, District	Operational Budget
Decommissioning Phase					
Removal and disposal of electrical cables, poles and transformers	Waste generation and inappropriate storage of electric equipment's	- A decommissioning plan for permanent closure of the project shall be developed prior to the decommissioning works. - 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. - 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.	Once	REG-EDCL, EPC contractor	Decommissioning budget

Activities	Description of Potential Impacts	Mitigations measures	Implement ation schedule	Responsible for implementati on	Budget (USD)
		- Materials such as insulators, concrete foundations etc. shall be disposed of at a formal waste disposal or recycling center. - The wooden poles shall be used as source of energy for cooking by local people. - Proper disposal of uninstalled electrical equipment's in site approved by Rwanda Environment Management Authority (REMA).			
	Water and soil pollution from transformer oil spillages	- All transformers in the equipment storage yard should be placed on wooden platforms laid in high-density polythene bags spread with sawdust to soak away and contain oil leakage. - The Contractors shall also be required to develop and implement Standard Handling Procedures for Transformers to take care of any oil spillage during transportation, storage and installation. - Damage to native grasses and low shrubs vegetation onsite during construction/installation shall be minimized. If there are areas where the natural vegetation has been severely damaged, these will be restored using native species. - Oil spill kits to be provided for during repair and maintenance of transformers	Once	REG-EDCL, EPC contractor	Decommissioning budget
	Ambient air pollution	- Personal protective equipment like dust masks will be availed to workers whenever needed; - Ensure regular servicing of vehicles and machinery likely to produce excessive gaseous emissions; - The speed of haulage trucks and other vehicles will be limited 30km/hr to reduce dust emission. - To ensure this, speed humps will be erected and the drivers of vehicles will be made to adhere to speed limits through sensitization and enforcement of penalties - unpaved access roads will be sprinkled with water (using water browsers); to minimize dust emissions caused by movement of vehicles	Once	REG-EDCL, EPC contractor	Decommissioning budget
Total budget					26 2000

Environmental and Social Monitoring Plan of Rwamagana district

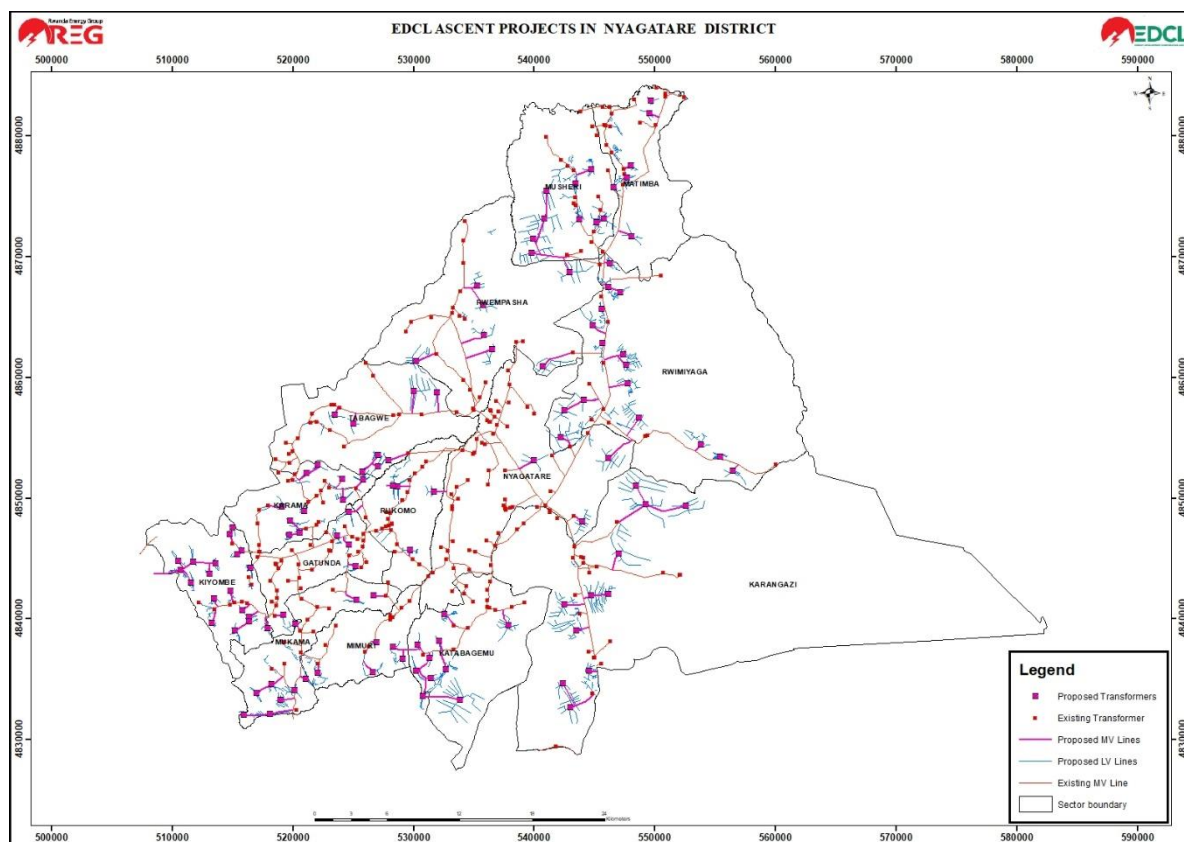
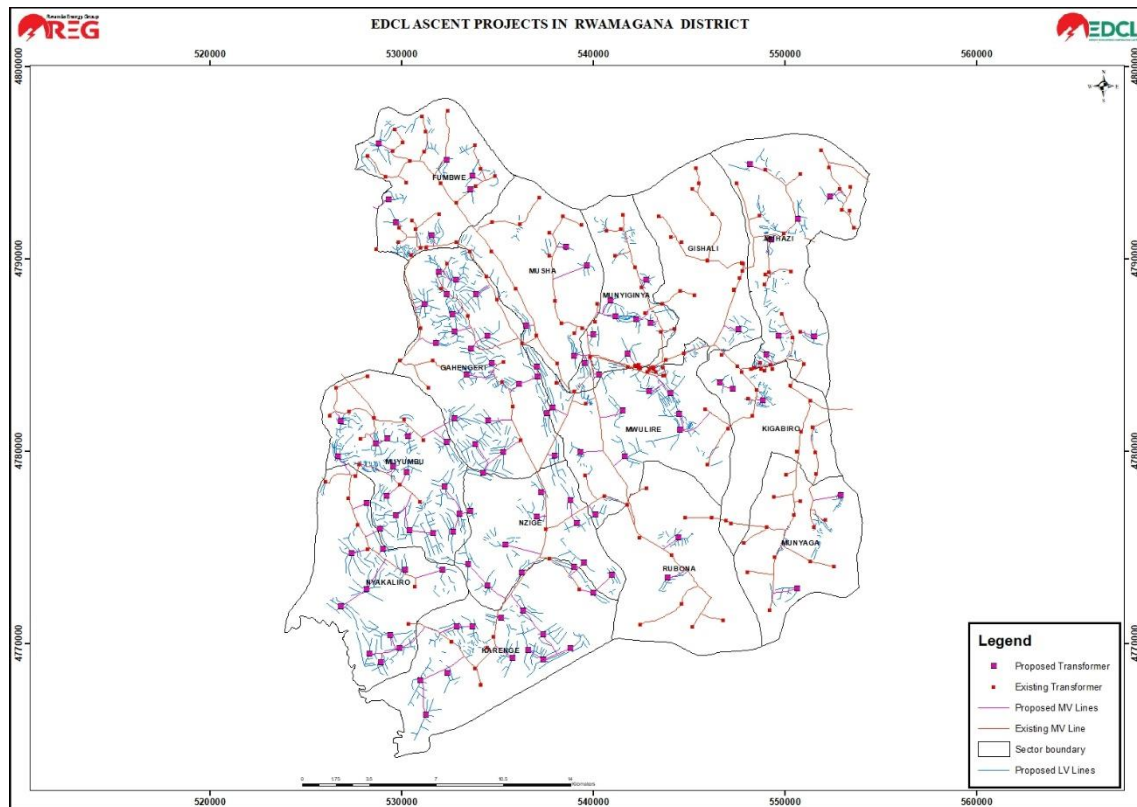
Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Pre-construction and project mobilization phase					
Securing of the RoW	RAP praped Full and fair compensation for affected crops, trees	Reports for affected crops, trees	Once before project activities	District/ local Authorities/ property valuer	To be determined under A-RAP
	Complaints associated to the transmission electrical cables located nearby residential houses	GRM logbook Project area	Regular	Districts local authorities/ PAPs	97,070 ²⁶
Construction phase					
Accidents and incidents	Number of accidents and incidents	Incidents and accidents logbook	When deemed necessary	EDCL /Districts local traffic police	no cost required for recording
Labor influx	Number of workers for the project	Workers log book by sex and by area of origin	Permanent	Contractor	No budget required to register
Increased traffic in the project area	Availability of traffic management plan	Availability of traffic management plan	Before project start	Contractor / supervisor	Budgeted for under ESMP
	Number of the traffic accidents	Report on traffic accidents	Monthly	Contractor / supervisor	No cost required for recording
	Flagmen at the construction site	Presence of Flagmen and traffic signals at the site	When necessary	Contractor / supervisor	Under construction budget
Risk of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),	Number of complaints related to GBV	Training reports and awareness minutes of SH, SEA and GBV	During project works	Contractor / supervisor	Under construction budget
		GBV complaints resolution reports	As appropriate	Contractor / supervisor	Under construction budget
		Availability of Code of conduct	Permanent	Contractor / supervisor	budgeted for under ESMP
Noise and vibrations	Noise and vibrations	Noise level (in dB) and vibrations levels	during project works	Contractor/ supervisor	300 for noise measurement in each district

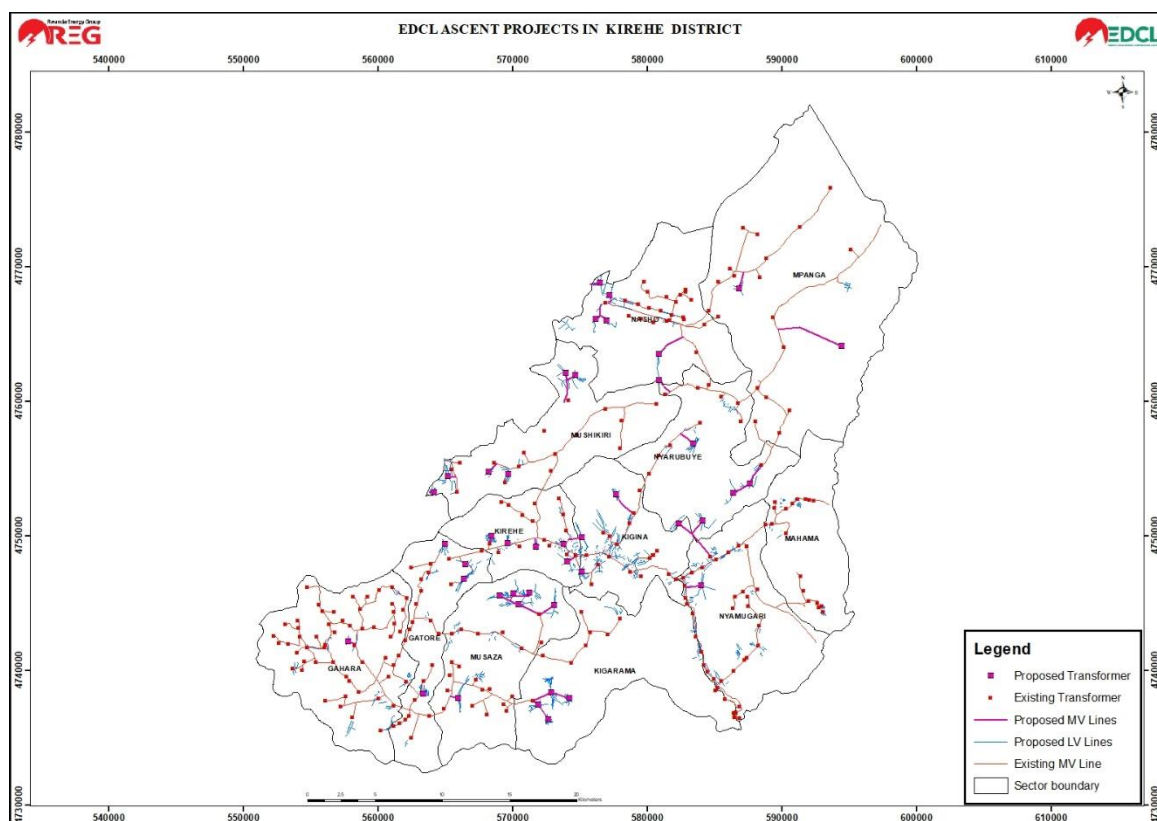
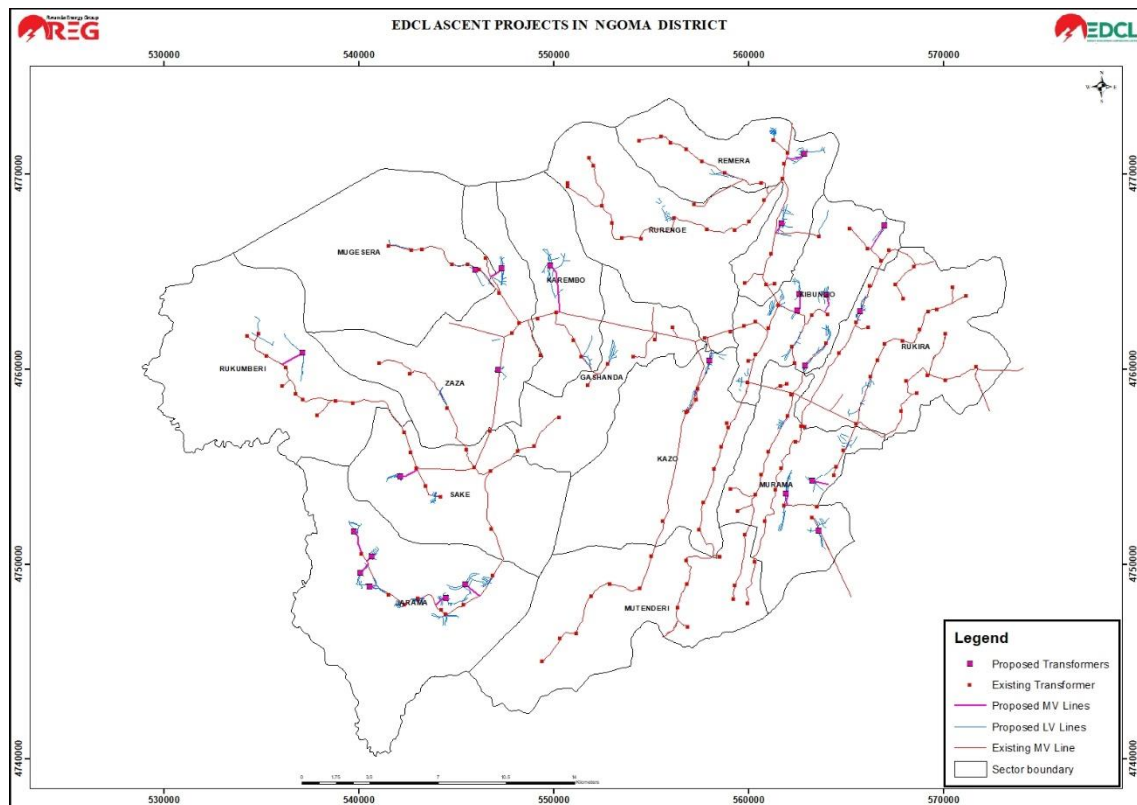
²⁶ Costing is based on estimation of 3 complaints by 1km of MV and 300 USD by complaints

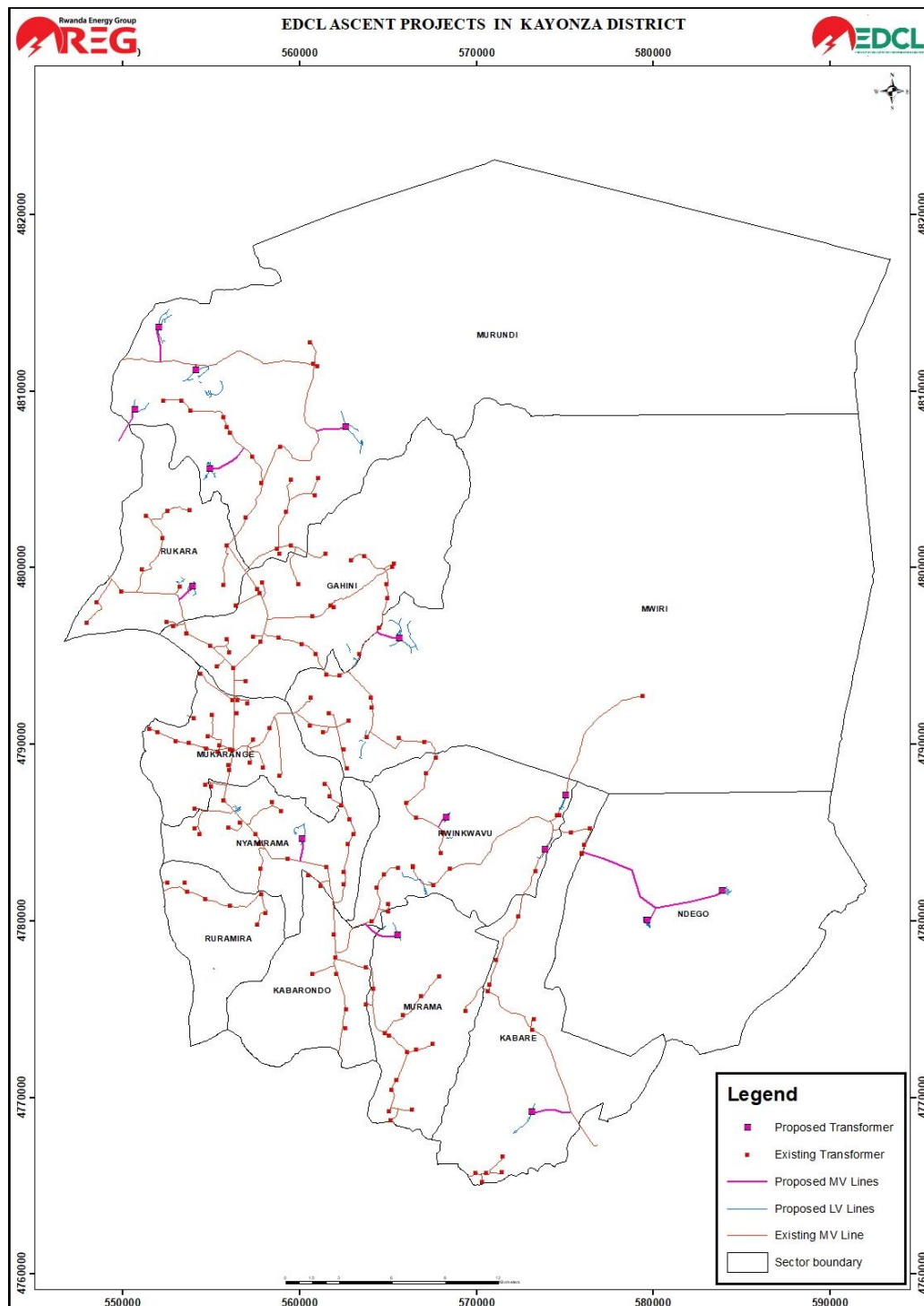
Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Air pollution	Equipment and automobiles in good conditions	Certificate of good working condition issued by automobile inspection center for all project machinery and vehicles	As appropriate	Contractor/ traffic police	750 for automobile certification
Soil erosion	Presence of soil erosion barriers at the project sites	Soil erosion and Turbidity in storm water	Daily	EDCL/ Districts	200
Soil Waste	Proper management of excavated soil and other soil waste generated from the project	Re- used excavated soil	regular	EDCL/ District	No cost is required
Fauna and flora removal	Reforestation where possible to offset loss of flora and fauna	Restored area	After project implementation	Locals authorities /local /EDCL/ Districts	cost for restauration to be included in project construction budget
Working conditions	Occupational health and Safety	Availability at site of OHS Plan	Permanent	EDCL/ District	Cost covered during the preparation of OHS plan
	Awareness on social, health and safety	Number of awareness conducted	Daily	EDCL/ district	5,000 for MoU signed between district hospital
	Incidents and accidents at the project site	Presence of warning and reminding sign posts at the site	daily	District/ EDCL	Cost for sign post covered under construction budget
	Personal Protective Equipment (PPEs)	Number of workers with PPEs	daily	EDCL/ District district / workers	40 USD to cater for overall PPE for each staff
HIV/ AIDS and other contaminating diseases	Health and sanitation plan for workers	Presence of sanitation facilities at project sites such as toilets and water	regular	EDCL/ Districts	300 to cater for sanitation facilities
Child and forced labor	Minimum working age and working condition	Employment record by age	regular	EDCL authorities/ workers/ local population	No cost is required

Environmental items	Monitoring item	Parameter/Indicator	Frequency	Responsible	Budget (USD)
Treeremoval (deforestation)	Areas of the project with cleared trees	Number of trees removed at by district	Once	EDCL / Contractor/ Districts	700
Operation phase					
Effects from electrocution	Presence of warning signs and anti-climbing barbed wire	Infrastructures damages Proper sagging Damaged poles and cables	Regular	EDCL/ District district/ local authorities/ local residents	Continuous: 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	Once	Contractors/ EDCL	2,000
TOTAL					106,360

Annex 9: Maps of the project location







Annex 11: List of contacted persons

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
	Maniragaba Joseph	Ny	Ny	Line man	0787533865	
	BIZIMANA Janvier	NYAGAZI	NYAGAZI	CSO NYAGAZI	0783071999	
	GASEUKA David	"	"	T.S.	0783302332	
	MUSABIMANA CROK	Nyagatare	Nyagatare	Umuhungu	0783175322	
	Alexis KAMAZI	Nyagatare	Nyagatare	Umuhungu	0780574217	
	Guraho Claudine	Nyagatare	Nyagatare	Umuhungu	0780532459	
	Clemente N. bapirwa	Nyagatare	Nyagatare	Umuhungu	0786211753	
	Leopard Hatebimana	Nyagatare	Nyagatare	Umuhungu	0780811401	
	MURUMIMANA Chabone	Nyagatare	Nyagatare	Umuhungu	0783363665	
	Nsengimana Vincent	Nyagatare	Nyagatare	Umuhungu	0783213110	
	habonabakiza Phillipe	Nyagatare	Nyagatare	Umuhungu	0786126211	
	Grotte Felicien	Nyagatare	Nyagatare	Umuhungu	0783126366	
	Sankaka Samuel	Gashyamba	Rwimbaga	Umuhungu	0789343133	
	Ntibanzimimana Jean	Gashyamba	Rwimbaga	Umuhungu	0780915055	
	Theorent Habokuzema	Gashyamba	Rwimbaga	Umuhungu	0783221498	
	Ngirumana Thandor	Gashyamba	Rwimbaga	Umuhungu	0784704956	
	Hababakiza Edephonse	Gashyamba	Rwimbaga	Umuhungu	0783477519	
	D. Demesene Rugamba	Gashyamba	Rwimbaga	Umuhungu	0782433553	
	Sinamenye Sylvester	Gashyamba	Rwimbaga	Umuhungu	0785792207	
	Ndoreyimana Adrien	Gashyamba	Rwimbaga	Umuhungu	0786724216	
	J. Claude Ntibanzimimana	Gashyamba	Rwimbaga	Umuhungu	0786514053	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
1	HABUMVURUMUZI Philbert	Ruhango	Kigabiro	T.S	0788360441	
2	KATIGIRIMANA EROK	Ruhango	Gashyamba	E-CO	0782853889	
3	MUMUKURU DONICEL	Ruhango	Kigabiro	T.L	0781487864	
4	NYAMAZIMANA JOSEPHINE	Ruhango	Muramba	Umuhungu	-	
5	MUKAMUGISEMA PHOEBE	Ruhango	Muramba	Umuhungu	0786741115	
6	NSHIMIMANA SIMBERT	Ruhango	Muramba	Umuhungu	0780742491	
7	MUKAMUGISEMA SYLVESTER	Ruhango	Muramba	Umuhungu	0785669865	
8	MUKAMUGISEMA STANISLAS	Ruhango	Muramba	Umuhungu	0782693370	
9	MUKAMUGISEMA LIKIANE	Ruhango	Muramba	Umuhungu	0785889844	
10	MUKAMUGISEMA JEAN CLAUDE	Ruhango	Muramba	Umuhungu	0783352915	
11	HAFASHIMANA THEONESTE	Ruhango	Muramba	Umuhungu	0780488667	
12	HABARUSHAKA J. CLAUDE	Ruhango	Muramba	Umuhungu	0782194745	
13	BURABARWA EDWARD	Ruhango	Muramba	Umuhungu	0789396419	
14	MUKAMUGISEMA PATRICK	Ruhango	Muramba	Umuhungu	0787856178	
15	MUKAMUGISEMA J. CLAUDE	Ruhango	Muramba	Umuhungu	0788868648	
16	KEPS BATIMBARA	Ruhango	Muramba	B.M/Rep	0780566221	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
1	RUBASINWA PLACIDE	Mfama	KAZO	Umukingi	0789244369	
2	HATEGEHIMANA J. BAPTISTE	Mfama	KAZO	Umukingi	078374454	
3	SEMATORO J. BOSCO	Mfama	KAZO	UBUHAMBI	0724408743	
4	MURABE J. M. KUBAKO	"	KAZO	URUGANDA	0783403472	
5	MURASI BONA	"	Rutenge	Ubukuru	0786037630	
6	BUTIMALIKO JOSUE	"	Rutenge	"	0790835307	
7	MURAHIMANA VESTINE	Nyoma	Rutenge	"	0723383762	
8	MURAHIMANA VESTINE	"	"	"	0782978882	
9	INGABIRE FLORENCE	Nyoma	Rutenge	"	0782007823	
10	MURAHIMANA JOSUE	Nyoma	Rutenge	Abagayama	0781516493	
11	MURAHIMANA EMILIE	"	"	Abagayama	0727108631	
12	MURAHIMANA JOSUE	"	"	"	0781949534	
13	MURAHIMANA JOSUE	"	"	"	0781949534	
14	MSHIMIRIMANA JOSEPH	"	"	"	0781218185	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
1	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
2	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
3	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
4	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
5	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
6	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
7	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
8	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
9	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
10	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
11	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
12	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
13	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
14	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
15	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
16	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	
17	MURAHIMANA JOSUE	KAZO	Rutenge	Umukingi	0786563251	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
	Mbungimana Vincent	Ngoma	Rurunge	Umushingi	0784529028	
	Munyahoje yvone	11	11	11	0780728773	
	Mugira Juvénale	11	11	11		
	Mubimanya Egide	11	11	11		
	Mbonyumwiza	11	11	11		
	Mugira Françoise	11	11	11		
	Mukamugenza	11	11	11		
	Mashanyarabwiro	11	11	11		
	Mubimanya Egide	11	11	11		
	Munyahoje Ignace	11	11	11		
	Munyahoje Théodore	11	11	11		
	Munyahoje	11	11	11		
	Munyahoje Théodore	11	11	11	0785081537	
	Mukamukanyirwa	11	11	11		
	Mubinda vedaste	11	11	11		
	Batakanwa Joseph	11	11	11	0783818460	
	Kanani Firmin	11	11	11	0783288803	
	Mukamukanyirwa	11	11	11		
	Munyahoje Yvonne	11	11	11		
	Munyahoje Yvonne	11	11	11		
	Munyahoje Yvonne	11	11	11		
	Munyahoje Yvonne	11	11	11		

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
	OSCAR Mubimanya	Nyagatare	Rumonge	Umutekaga	0732783358	
	Sibomana Alimable	Nyagatare	Rumonge	Umutekaga	0722056773	
	NEIRU WONSANGA	Nyagatare	Rumonge	Umutekaga	078840004	
	NZABASIGAHETA	Nyagatare	Rumonge	Umutekaga	0787544745	
	Munyahoje Ignace	Nyagatare	Rumonge	Technicien	0787455754	
	Katukane James	Nyagatare	Rumonge	Umutekaga	073469155	
	Claude Habumana	Nyagatare	Rumonge	Umutekaga	0723171968	
	Munyahoje Yvonne	Nyagatare	Rumonge	Umutekaga	0784416370	
	Munyahoje Yvonne	Nyagatare	Rumonge	Umutekaga	0783439611	
	IZAKAREMYE Jolithe	Gatsibo	Kabarore	CSO / GATISIBA	0783923777	
	RUSAGARA Felicien	Gatsibo	Kabarore	Brand Technician	0783363114	
	Munyahoje Yvonne	Gatsibo	Kabarore	Umutekaga	0790255026	
	Edouard Rugemana	Gatsibo	Kabarore	Umutekaga	0791741069	
	Augustin Mubimanya	Gatsibo	Kabarore	Umutekaga	0784220690	
	Mubimanya Patrick	Gatsibo	Kabarore	Umutekaga	0782107716	
	Emile Nyandwa	Gatsibo	Kabarore	Umutekaga	0783103068	
	J. N. Amour Habumana	Gatsibo	Kabarore	Umutekaga	0781271850	
	Mubimanya Mubimanya	Gatsibo	Kabarore	Umutekaga	0783600300	
	Mubimanya Mubimanya	Gatsibo	Kabarore	Umutekaga	0784212017	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
1	Kaxinda Jean Baptiste	Ngoma	Rwenzori	ulubuhizi	0783272211	
2	Mtakarutimara	Ngoma	Rwenzori	ulubuhizi	0782583442	
3	Mubakarisa Emmanuel	Ngoma	Rwenzori	ulubuhizi	0789971563	
4	Mubakarisa Emmanuel	Ngoma	Rwenzori	ulubuhizi	0781082470	
5	Ntshakumandizana Velele	Ngoma	Rwenzori	ulubuhizi	0785760227	
6	Ndagijimasa Veranté	Ngoma	Rwenzori	ulubuhizi	0737713836	
7	Batindikiyeflozine	Ngoma	Rwenzori	ulubuhizi		
8	Satete Jean Kwaile	Ngoma	Rwenzori	ulubuhizi	0782862672	
9	Ndabimama Jean Polo	Ngoma	Rwenzori	ulubuhizi	0780341584	
10	Niyoyita Edile	Ngoma	Rwenzori	ulubuhizi	0734352834	
11	Nyazi Frederick	Ngoma	Rwenzori	ulubuhizi	0787078858	
12	Ndabimama Velele	Ngoma	Rwenzori	ulubuhizi		
13	Hakimana Hippolyte	Ngoma	Rwenzori	ulubuhizi	0788344460	
14	Ngonyani Yusef Mokele	Ngoma	Rwenzori	ulubuhizi	0726872072	
15	Makharane Paul	Ngoma	Rwenzori	ulubuhizi	0783869507	
16	Niyonkura detetie	Ngoma	Rwenzori	ulubuhizi	0780657601	
17	Niyonkura detetie	Ngoma	Rwenzori	ulubuhizi	0783496978	
18	Muramira Emmanuel	Ngoma	Rwenzori	ulubuhizi	0783274471	
19	Mukweli Emmanuel	Ngoma	Rwenzori	ulubuhizi	0795970940	
20	Yakira Fredina	Ngoma	Rwenzori	ulubuhizi	0780876237	
21	Niyonkura detetie	Ngoma	Rwenzori	ulubuhizi		

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
	Mwamaliza Benoit	Kiruhira	Kiruhira	OSC Perception	078878980	
	MUSI CENA Vaché	Ngoma	Kibungo	T.S. NGOMA	0788790910	
	MWIMANA Vemant	Ngoma	Kibungo	TECHNICIAN	0788878666	
	MWIMANA Vemant	Ngoma	Kibungo	Electrical Engineer	0785433938	
5	MWIMANA Albert	Ngoma	Kibungo	Ag. desc	0788803944	
6	MWIMANA Eusebe	Ngoma	Kibungo	District Engineer	078566043	
4	MWIMANA Eugene	Ngoma	Kibungo	District BI	0787148202	
8	Mwamaliza Benoit	Ngoma	Kibungo	ulubuhizi	078802483	
5	Hakimana Paul	Ngoma	Kibungo	ulubuhizi	079097325	
10	Hakimana Paul	Ngoma	Kibungo	ulubuhizi	0782639359	
11	Mwamaliza Benoit	Ngoma	Kibungo	ulubuhizi	0726865081	
12	MWIMANA Vemant	Ngoma	Kibungo	ulubuhizi	079641501	
13	Mwamaliza Benoit	Ngoma	Kibungo	ulubuhizi	078522747	
14	MWIMANA Vemant	Ngoma	Kibungo	ulubuhizi	0788483637	
15	Mwamaliza Benoit	Ngoma	Kibungo	ulubuhizi	078337478	
16	Mwamaliza Benoit	Ngoma	Kibungo	ulubuhizi	0789565283	
17	Mwamaliza Benoit	Ngoma	Kibungo	ulubuhizi	0729665180	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
1	Ikooma Stephen	Kayanza	Mukaranga	BM-REG	078548097	
2	Mudenge Allan	Kayanza	Mukaranga	TS	073055015	
3	Kouirouda Fred	Kayanza	Mukaranga	Technician	0784158312	
4	Idagana Innocent	Kayanza	Ruramba	leader	0725539962	
5	MATIKUZE Phocas	Kayanza	Ruramba	DOS	078825142	
6	KAMIRE ESPERANCE	Kayanza	Ruramba	Umutungo	0782249313	
7	SIBOMANA JOSEPH	Kayanza	Ruramba	Umutungo	0789719960	
8	UMAMUNGU BACHELE	Kayanza	Ruramba	Umutungo	0784559257	
9	MUSABYIMANA DEMISE	Kayanza	Ruramba	Umutungo	0784065026	
10	MISHIMWE CLARISSE	Kayanza	Ruramba	Umutungo	0789450697	
11	MUSABYIMANA FRANÇOISE	Kayanza	Ruramba	Umutungo	0726622494	
12	MYOSISUBIRO DINIE	Kayanza	Ruramba	Umutungo	0786892719	
13	MUSENKWIYERA DELPHINE	Kayanza	Mukaranga	Umutungo	0789462460	
14	IKIZANGE JOSEPHINE	Kayanza	Mukaranga	Umutungo	0786191424	
15	MYIKAMBA SORINE	Kayanza	Mukaranga	Umutungo	0789549519	
16	MUKAMUKA FRANKINE	Kayanza	Mukaranga	Umutungo	0784932021	
17	KABUYENZI CHAKIRA	Kayanza	Mukaranga	Umutungo	0780253606	
18	UWERA CLARISSE	Kayanza	Mukaranga	Umutungo	-	
19	MYOMUKARI CHANTIRI	Kayanza	Ruramba	Umutungo	0791634276	
20	MUKYIMANA AIME	Kayanza	Ruramba	Umutungo	0791936484	
21	UMUKIZA DATIVE	Kayanza	Ruramba	Umutungo	0799196777	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
1	NGAYISABA Jean Paul	Kirehe	Kigina	Technical supervisor	0788709444	
2	MUKIMBARA	KIREHE	Kigina	Umutungo	-	
3	MUBAKYEMBA MATHIE	KIREHE	Kigina	Umutungo	0788757191	
4	HABAMUNGU Emmanuel	KIREHE	Kigina	Umutungo	-	
5	MUSIBIRO JEAN BAPTISTE	KIREHE	Kigina	Umutungo	078648242	
6	KABUYENZI VEMUSTE	KIREHE	Kigina	Umutungo	0783591466	
7	NYONZIMA ALPHONSE	KIREHE	Kigina	Umutungo	0797515337	
8	MUHAYENZI MATHIE	KIREHE	Kigina	Umutungo	0786492286	
9	ISINGIZWE PACIFIQUE	KIREHE	Kigina	Umutungo	0785897813	
10	NYONZIMA ALPHONSE	KIREHE	Kigina	Umutungo	0792581607	
11	KARISA Tadeo	KIREHE	Kigina	Umutungo	0785331566	
12	UMUKYIMANA AMERINE	KIREHE	Kigina	Umutungo	0793719773	
13	MAMUKIRA OLIVIER	KIREHE	Kigina	Umutungo	0793219501	
14	BIZIMUKA FREDERIC	Kirehe	Kigina	Umutungo	0785921206	
15	MUTESI MONIQUE	Kirehe	Kigina	Umutungo	0791191933	
16	Valens Murenzi	Kirehe	Kigina	Umutungo	0780666279	
17	Nyirondoyira Jean	Kirehe	Kigina	Umutungo	0793823177	
18	Mueller Nkundabanyanga	Kirehe	Kigina	Umutungo	0785913383	
19	MURAMUNGU Benjamin	Kirehe	Kigina	Umutungo	07889697220	
20	MURAMUNGU Oziel	Kirehe	Kigina	Umutungo	0788699112	

consulted Stakeholders during Onsite investigation of EPCs (Eastern province)

No	Names	District	Sector	Position	Telephone	Signature
01	NTEGEMUHIHO VEDOSTE	GATUNGO	RUMUNGO	Headteacher	0783665551	
02	UTAZIRUBAMUKA KISPOU	GATUNGO	Umurunga	Nurse P/School	0788210891	
03	BUTIMANA CANISIVU	BUGESERA	NYAMIRA	Commercial Secretary	0788210883	
04	Muhirapaba Samuel	BUGESERA	JURU	Umurunga	0783322506	
05	Ukamuhokeye Samuel	Bugesera	Juru	electrician/IT	0788877763	
06	Mukapatsire Amacigabo	Bugesera	Juru	Umurunga		
07	Schizapuzwa Lemucigabo	Bugesera	Juru	Umurunga	0783559245	
08	Mutebambuka Mirodi	Bugesera	Juru	Umurunga	0783085536	
09	Mushumirama Sylvain	Bugesera	Juru	Umurunga	078399462	
10	Mwari Habinano	Bugesera	Juru	Umurunga	0784767337	
11	Gustin Bogaureka	Bugesera	Juru	Umurunga	0783347678	
12	Valens Mungimanya	Bugesera	NYAMATA	Umurunga	0783601181	
13	Valens Tashimbare	Bugesera	NYAMATA	Umurunga	0783108680	
14	J.P. Iyer Gasamagiro	Bugesera	NYAMATA	Umurunga	0783255831	
15	J. Claude Mushumirama	Bugesera	NYAMATA	Umurunga	0786763706	
16	Mukashyamba Egeranzu	Bugesera	Juru	Umurunga		
17	Constance Umurunga	Bugesera	Juru	Umurunga	0783701186	
18	Dona Ken Muhimanya	Bugesera	Juru	Umurunga	0787736628	
19	Alphonse Ntashyamba	Bugesera	Juru	Umurunga	0791980140	
20	Symon Ntashyamba	Bugesera	Juru	SEBU	0785260973	
21	Edouard Ntashyamba	Bugesera	Juru	Umurunga	0785512778	

Annex 12: 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
11. The Chance Finds Procedures should identify the responsible institution(s) to be contacted depending on the type of cultural heritage found on site. The following table prides an indicative list of some of the authorities that can be contacted:

Type of cultural heritage	Responsible agency/authority
Grave	Local authorities
Mass graves	Local authorities
Genocide memory/memorials	Ministry of National Unity and local authorities
Archaeological items	Rwanda Cultural Heritage Academy

Annex 13: Typical fauna and flora mostly frequent in the project areas and their conservation status

Typical Bird species of the project area

No	Order	Family	Scientific Name	Common Name	Vernacular Name	IUCN Redlist Status	Protected in Rwanda
1	Accipitriformes	Accipitridae	<i>Buteo augur</i>	Augur buzzard	Icyanira	LC	
2	Accipitriformes	Accipitridae	<i>Milvus migrans</i>	Black kite	Sakabaka	LC	
3	Accipitriformes	Accipitridae	<i>Polyboroides typus</i>	African Harrier Hawk	Ikizu	LC	
4	Accipitriformes	Accipitridae	<i>Accipiter melanoleucus</i>	Great Sparrowhawk	Agaca	LC	
5	Alcedinidae	Alcedinidae	<i>Megaceryle mazima</i>	Giant kingfisher	Murobyi	LC	
6	Apodiformes	Apodidae	<i>Apus caffer</i>	white-rumped swift	Intashya	LC	
7	Charadriiformes	Charadriidae	<i>Venellus senegallus</i>	African Wattled Lapwing	Inkurakura	NA	
8	Charadriiformes	Charadriidae	<i>Ardea melanocephala</i>	Black-Headed Heron	Uruyongonyongo	LC	
9	Coliiformes	Coliidae	<i>Colius striatus</i>	Spickled Mousebird	Umusure	LC	
10	Columbiformes	Columbidae	<i>Columba larvata</i>	Lemon dove	Inuma	LC	yes
11	Cuculiformes	Cuculidae	<i>Centropus superciliosus</i>	White-browed Coucal	Ikibiribiri	LC	
12	Galliformes	Phasianidae	<i>Pternistis hildebrandti</i>	Hildebrandt's Francolin	Inkware	LC	
13	Gruiformes	Gruidae	<i>Balearica regulorum</i>	Grey Crowned Crane	Umusambi	Endangered	yes
14	Passeriformes	Corvidae	<i>Corvus albus</i>	Pied Crow	Icyiyoni	LC	
15	Passeriformes	Passeridae	<i>Passer griseus</i>	Common Grey-Headed Sparrow	Igishwi	LC	
16	Passeriformes	Leiothrichidae	<i>Turdoides jardineii</i>	Arrow-Marked Babbler	Ikijwangajwanga	LC	yes
17	Passeriformes	Motacillidae	<i>Motacilla aguimp</i>	African-Pied Wagtail	Inyamanza	LC	
18	Passeriformes	Muscicapidae	<i>Cossypha heuglini</i>	White-browed Robin-chat	Inyombya	LC	

N o	Order	Family	Scientific Name	Common Name	Vernacular Name	IUCN Redlist Status	Protected in Rwanda
19	Passeriformes	Ploceidae	<i>Ploceus pelzelni</i>	Slender-Billed eaver	Isandi	LC	
20	Passeriformes	Icteridae	<i>Agelaius phoeniceus</i>	Red-winged blackbird	Makote	LC	
21	Passeriformes	Viduidae	<i>Vidua macroura</i>	Pin-tailed Whydah	Matene	LC	yes
22	Passeriformes	Nectariniidae	<i>Hedydipna collaris</i>	Collared Sunbird	Umununi	LC	
23	Passeriformes	Estrildidae	<i>Lagonosticta rubricate</i>	African Firefinch	Ifundi	ss	
24	Passeriformes	Motacillidae	<i>Motacilla aguimp</i>	African-Pied Wagtail	Inyamanza	LC	
25	Passeriformes	Passeridae	<i>Passer griseus</i>	Common Grey-Headed Sparrow	Igishwi	LC	
26	Passeriformes	Ploceidae	<i>Ploceus pelzelni</i>	Slender-Billed Weaver	Isandi	LC	
27	Passeriformes	Corvidae	<i>Corvus albus</i>	Pied Crow	Icyiyoni	LC	
28	Passeriformes	Viduidae	<i>Vidua macroura</i>	Pin-tailed Whydah	Matene	LC	yes
29	Passeriformes	Passeridae	<i>Passer melanurus</i>	Cape Sparrow	Uruhuri	LC	
30	Passeriformes	Pycnonotidae	<i>Pycnonotus tricolor</i>	Common bulbul	Ikirogoryo	LC	
31	Passeriformes	Ploceidae	<i>Euplectes axillaris</i>	Fan-tailed widowbird		LC	
32	Passeriformes	Laniidae	<i>Lanius excubitoroides</i>	Grey-Backed Fiscal		LC	
33	Pelecaniformes	Ardeidae	<i>Bubulcus ibis</i>	Cattle Egret	Inyange	LC	Yes
34	Pelecaniformes	Threskiornithidae	<i>Threskiornis aethiopicus</i>	Sacred Ibis	Nyirabazana	LC	
35	Strigiformes	Strigidae	<i>Bubo africanus</i>	Spotted eagle-owl	Igihunyira	LC	ye

Typical reptile species of the project area

N o	Order	Family	Scientific Name	Common Name	Vernacular Name	IUCN Redlist Status	Protected in Rwanda
1	Squamata	Viperiade	<i>Bitis arietans</i>	Puff Adder	Impiri	LC	yes

2	Squamata	Elapidae	<i>Dendroaspis polylepis</i>	Black Mamba	Insana	LC	
3	Squamata	Agamidae	<i>Lacerta agama</i>	Agama	Icyugu	LC	
4	Squamata	Colubridae	<i>Philothamnus heterolepidotus</i>	African Green Snake	Incarwatsi	NA	
5	Squamata	Lamprophiidae	<i>Psammophis sibilans</i>	Striped sand snake	Imbarabara	LC	
6	Squamata	Chamaeleonidae	<i>Trioceros rudis</i>	Coarse Chameleon	Uruvu	LC	
7	Squamata	Lamprophiidae	<i>Boaedon lineatus</i>	Striped house snake	Ikiryambeka	LC	
8	Squamata	Elapidae	<i>Naja nigricollis</i>	Black-necked spitting cobra	Incira	LC	
9	Squamata	Lacertidae	<i>Zootoca vivipara</i>	Common lizard	Umuserebanya	LC	
10	Testudines	Pelomedusidae	<i>Pelusios subniger</i>	Black-bellied Hinged Terrapin*	Akanyamasyo	LC	yes

Typical amphibian species of the project area

No	Order	Family	Scientific Name	Common Name	IUCN Red list Status
1	Anura	Bufonidae	<i>Sclerophrys regularis</i>	African common toad	LC
2	Anura	Hyperoliidae	<i>Afrixanus quadrivittatus</i>	Four-lined Spiny Reed Frog	LC
3	Anura	Ptychadenidae	<i>Ptychadena porosissima</i>	Grassland Ridged Frog	LC
4	Anura	Hyperoliidae	<i>Afraxalus quadrivittatus</i>	Four-lined Spiny Reed Frog	LC
5	Anura	Ptychadenidae	<i>Ptychadena mascareniensis</i>	Mascarene Ridged Frog	LC
6	Anura	Phrynobatrachidae	<i>Phrynobatrachus natalensis</i>	Natal dwarf puddle frog	LC
7	Anura	Bufoniidae	<i>Sclerophrys regularis</i>	African common toad	LC

Typical mammal species of the project area

No	Order	Family	Scientific Name	Common Name	Vernacular Name	IUCN Redlist Status	Protected in Rwanda
1	Carnivora	Viverridae	<i>Civettictis civetta</i>	African Civet	Urutoni	LC	yes
2	Carnivore	Canidae	<i>Canis familiaris</i>	Feral dog	Imbwa y'agasozi	-	
3	Carnivora	Felidae	<i>Felis lybica</i>	African wildcat	Injangwe y'agasozi	LC	
4	Rodent	Nesomyidae	<i>Cricetomys gambianus</i>	Gambian rat	Isiha	LC	

5	Carnivora	Felidae	<i>Panthera pardus</i>	Leopard*	Ingwe	Vulnerable	yes
6	Carnivora	Canidae	<i>Canis adustus</i>	Side Striped Jackal	Imbwebwe	LC	
7	Lagomorpha	Leporidae	<i>Lepus victoriae</i>	African savannah hare	Urukwavu rw'agasozi	LC	

Typical plant species of the project area

No	Order	Family	Scientific name	Vernacular name	IUCN Red list status	Protected in Rwanda
1	Alismatales	Araceae	<i>Colocasia esculenta</i>	Amateke	LC	
2	Asparagales	Asparagaceae	<i>Agave sisalana</i>	Umugwegwe	LC	
3	Asparagales	Asparagaceae	<i>Dracaena afromontana</i>	Umuhati	LC	
4	Asterales	Asteraceae	<i>Ageratum conyzoides</i>	Akaziraruguma	LC	
5	Asterales	Asteraceae	<i>Bidens pilosa</i>	Inyabarasanya	LC	
6	Asterales	Asteraceae	<i>Crassocephalum vitellinum</i>	Isununu	LC	
7	Asterales	Asteraceae	<i>Helianthus annuus</i>	Igihwagari	LC	
8	Asterales	Asteraceae	<i>Melanthera scandens</i>	Kimari	LC	
9	Asterales	Asteraceae	<i>Vernonia amygdalina</i>	Umubilizi	-	
10	Asterales	Asteraceae	<i>Sonchus luxurians</i>	Rurira	-	
11	Asterales	Asteraceae	<i>Helianthus annuus</i>	Igihwagari	LC	
12	Asterales	Asteraceae	<i>Tagetes minuta</i>	Nyiramunukana bi	-	
13	Asterales	Asteraceae	<i>Guizotia scabra</i>	Igishikashike	-	
14	Asterales	Asteraceae	<i>Blumea brevipes</i>		-	
15	Asterales	Asteraceae	<i>Coryza sumatrensis</i>	Bambuwa	-	
16	Brassicales	Caricaceae	<i>Carica papaya</i>	Ipapayi	LC	
17	Brassicales	Moringaceae	<i>Moringa oleifera</i>	Moringa	LC	
18	Brassicales	Tropaeolaceae	<i>Tropaeolum majus</i>	Capucine	-	
19	Caryophyllales	Phytolaccaceae	<i>Phytolacca dodecandra</i>	Umuhoko	LC	
20	Commelinales	Commelinaceae	<i>Commelina benghalensis</i>	Uruteja	LC	
21	Commelinales	Commelinaceae	<i>Commelina benghalensis</i>		-	
22	Cucurbitales	Cucurbitaceae	<i>Cucurbita pepo</i>	Igihaza	LC	
23	Fabales	Fabaceae	<i>Phaseolus vulgaris</i>	Ibishyimbo	LC	
24	Fabales	Fabaceae	<i>Glycine max</i>	Soya	LC	
25	Fabales	Mimosaceae	<i>Acacia sieberiana</i>	umunyinya	LC	
26	Fabales	Fabaceae	<i>Calliandra calothyrsus</i>	Kariyandara	LC	
27	Fabales	Fabaceae	<i>Indigofera arrecta</i>	Umusororo	LC	
28	Fabales	Fabaceae	<i>Senna spectabilis</i>	Kasiya	LC	
29	Fabales	Fabaceae	<i>Erythrina abyssinica</i>	Umuko	LC	yes
30	Fabales	Fabaceae	<i>Calliandra calothyrsus</i>	Kariyandra	-	
31	Fabales	Fabaceae	<i>Cassia floribunda</i>	Umwicanzoka	-	
32	Gentianales	Apocynaceae	<i>Carissa edulis</i>	Umushubi	LC	

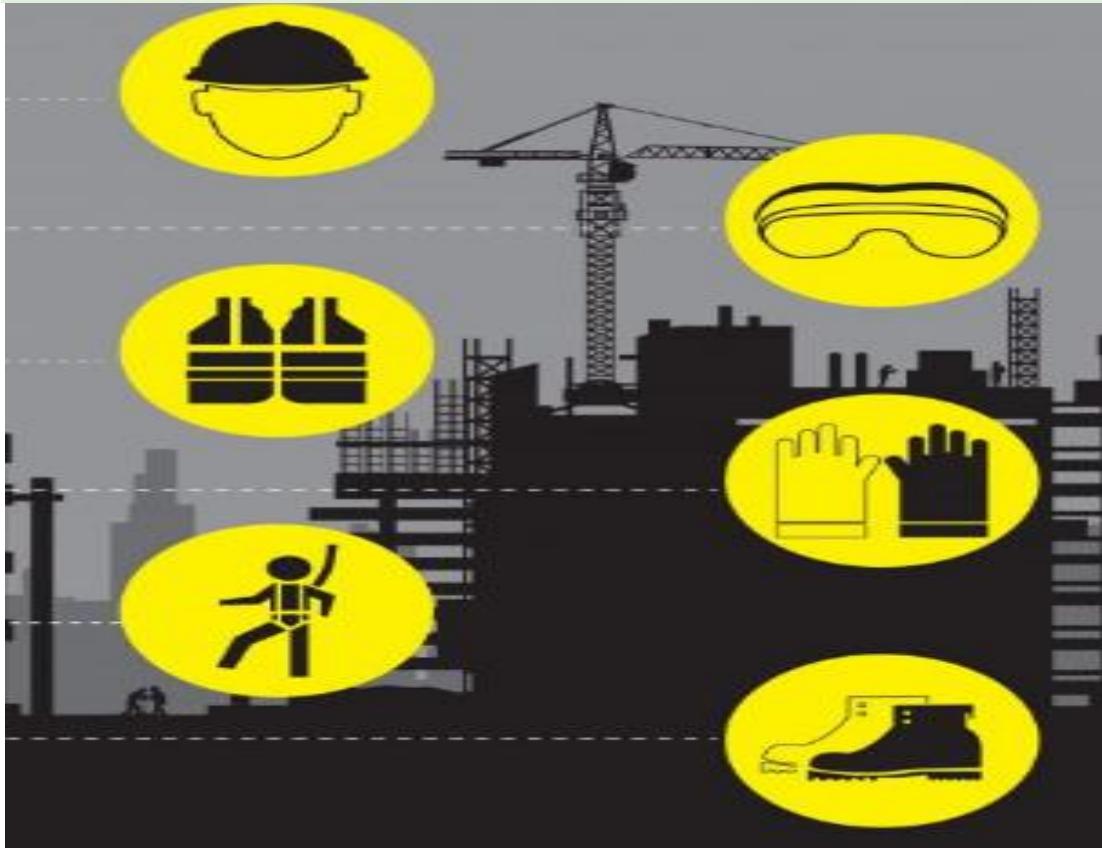
N o	Order	Family	Scientific name	Vernacular name	IUCN Redli st status	Protecte d in Rwanda
33	Gentianales	Rubiaceae	<i>Pavetta ternifolia</i>	Umumenamabu ye	LC	
34	Gentianales	Rubiaceae	<i>Coffea robusta</i>	Ikawa	LC	
35	Lamiales	Lamiaceae	<i>Lantana camara</i>	Umuhenyeri	LC	
36	Lamiales	Acanthaceae	<i>Acanthus pubescens</i>	Igitovu	LC	
37	Lamiales	Bignoniaceae	<i>Markhamia lutea</i>	Umusave	LC	
38	Lamiales	Lamiaceae	<i>Leonotis nepetifolia</i>	Igicumucumu	LC	
39	Lamiales	Lamiaceae	<i>Ocimum suave</i>	Umunyanya	LC	
40	Lamiales	Lamiaceae	<i>Salvia nilotica</i>	Urukembagufa	LC	
41	Lamiales	Lamiaceae	<i>Clerodendrum rotundifolium</i>	Ikiziranyenzi	-	
42	Lamiales	Acanthaceae	<i>Acanthus pubescens</i>	Igitovu	-	
43	Laurales	Lauraceae	<i>Persea Americana</i>	Avoca	LC	
44	Magnoliales	Annonaceae	<i>Annona reticulate</i>	Umutimaw'imfizi	LC	
45	Malpighiales	Euphorbiaceae	<i>Euphorbia tirucalli</i>	Umuyenzi	LC	
46	Malpighiales	Euphorbiaceae	<i>Manihot esculenta</i>	Umwumbati	LC	
47	Malpighiales	Euphorbiaceae	<i>Ricinus communis</i>	Ikibonobono	LC	
48	Malpighiales	Euphorbiaceae	<i>Tragia brevipes</i>	Isusa	LC	
49	Malpighiales	Passifloraceae	<i>Passiflora edulis</i>	Itunda	LC	
50	Malpighiales	Clusiaceae	<i>Symphonia globulifera</i>	Umushishi	LC	
51	Malvales	Malvaceae	<i>Triumfetta sp.</i>	Umucundura	LC	
52	Myrtales	Myrtaceae	<i>Psidium guajava</i>	Ipera	LC	
53	Myrtales	Myrtaceae	<i>Eucalyptus sp.</i>	Intusi	-	
54	Pinales	Cupressaceae	<i>Cupressus spp.</i>	Sipure	LC	
55	Pinales	Pinaceae	<i>Pinus patula</i>	Pinusi	LC	
56	Poales	Poaceae	<i>Oryza sativa</i>	Umuceri	LC	
57	Poales	Poaceae	<i>Zea mays</i>	Ibigori	LC	
58	Poales	Cyperaceae	<i>Cyperus papyrus</i>	Urufunzo	LC	
59	Poales	Fabaceae	<i>Theprosia voghelii</i>	Umuruku	LC	
60	Poales	Poaceae	<i>Sporobolus pyramidalis</i>	umutsina	LC	
61	Poales	Poaceae	<i>Pennisetum clandestinum</i>	Umucaca	LC	
62	Poales	Cyperaceae	<i>Rhynchospora corymbosa</i>	Urukangaga	LC	
63	Poales	Poaceae	<i>Pennisetum purpureum</i>	Urubingo	LC	
64	Poales	Poaceae	<i>Phragmites mauritanus</i>	Uruseke	LC	
64	Poales	Poaceae	<i>Saccharum officinarum</i>	Igisheke	LC	
65	Poales	Poaceae	<i>Sorghum vulgare</i>	Amasaka	LC	
66	Poales	Poaceae	<i>Yushania alpine</i>	Umugano	-	
67	Poales	Poaceae	<i>Setaria barbata</i>	Urukoko	-	
68	Proteales	Proteaceae	<i>Grevillea robusta</i>	Gerevileya	LC	
69	Ranunculale s	Menispermace ae	<i>Stephania abyssinica</i>	Umurandagashi	LC	
70	Rosales	Moraceae	<i>Ficus thonningii</i>	Umuwumu	LC	yes
71	Rosales	Mosaceae	<i>Artocarpus heterophyllus</i>	Igifenesi	LC	
72	Sapindales	Anacardiaceae	<i>Mangifera indica</i>	Umwembe	LC	
73	Sapindales	Meliaceae	<i>Cedrela serrata</i>	Cederera	LC	

N o	Order	Family	Scientific name	Vernacular name	IUCN Redli st status	Protecte d in Rwanda
74	Sapindales	Rutaceae	<i>Citrus sinensis</i>	Icunga	LC	
75	Sapindales	Ruteaceae	<i>Citrus limon</i>	Indimu	LC	
76	Solanales	Solanaceae	<i>Solanum tuberosum</i>	Ibirayi	LC	
77	Solanales	Solanaceae	<i>Solanum lycopersicum</i>	Inyanya	LC	
78	Solanales	Convolvulacea e	<i>Ipomoea batatas</i>	Ikijumba	LC	
79	Solanales	Solanaceae	<i>Capsicum spp.)</i>	Urusenda	LC	
80	Solanales	Solanaceae	<i>Solanum melongena</i>	Intoryi	-	
81	Solanales	Solanaceae	<i>Cyphomandra betacea</i>	Ikinyomoro	-	
82	Solanales	Solanaceae	<i>Solanum aculeastrum</i>	Umutobotobo	-	
83	Zingibinales	Musaceae	<i>Musa spp.</i>	Insina	LC	



Annex 14: 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 EASTERN PROVINCE OF RWANDA



March, 2026

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	302
1. INTRODUCTION	307
1.1. Objective of Occupational Health and Safety Plan	307
1.3. Project Location and Activities	307
1.3.1. Design and construction phases	308
1.3.2. Operation phase and Maintenance of the RoW	308
1.3.3. Decommissioning phase	308
2. POLICY STATEMENT, ROLES, AND RESPONSIBILITIES	309
2.1. Occupational Health and Safety Policy Statement	309
2.2. Zero accident policy	309
2.3. Incident readiness	309
2.4. Personal initiative empowerment	310
2.5. Continuous Improvement	310
2.6. OHSP Management team and responsibilities	310
2.6.1. Project Manager	310
2.6.2. Site Manager	311
2.6.3. Site Supervisors/ Foremen	311
3. OCCUPATIONAL HEALTH AND SAFETY PROCEDURES	312
3.1. Identification and Evaluation of Risks	312
3.1.1. Risk identification	313
3.1.2. Method of evaluation	313
3.1.3. Hazard identification	313
3.2. Risk assessment and Management.	314
3.2.1. Safety Inspections	314
3.2.2. Job hazard analysis	314
3.2.3. Stop work authority.	315
3.3. Personal Protective Equipment	315
3.3.1. Appropriate personnel protective equipment	315
3.3.2. Type of Personal Protective Equipment (PPE)	315
3.3.3. PPE for working at Heights	316
3.3.4. PPE maintenance and storage	316
3.3. Signs and markings	317
3.4. Incident and accidents management	318
3.4.1. Incident Notification and Reporting	318
3.4.2. Injury and accident management	318
3.4.3. First Aid and Emergency Medical	319
3.4.4. Incident report and notification	319
3.4.5. Contact information:	320
3.4.6. Communication	321
3.5. Material and works handling.	321
3.5.1. Electrical facilities and installation	321
3.5.2. Load handling.	322
3.5.3. Lifting equipment	323
3.5.4. Walking and working surfaces	323
3.5.5. Ladders handling	323
3.6. Work at heights	324
3.6.1. General requirements	324
3.7. Fire prevention and protection.	325
3.8. Site roads and transport of material	326
3.8.1. Work on roads	326
3.8.2. Driving, traffic, and transport Safety	326

3.8.3. Heavy motor vehicles	326
3.8.4. Light vehicle operations.....	327
3.9. Housekeeping, Tools, and equipment handling.....	327
3.9.1. Housekeeping	327
3.9.2. Slips, trips, and falls	327
3.9.3. Tools and equipment.....	327
3.9.4. Hazard material awareness.....	328
3.10. Alcohol and Drug Control Plan.....	328
4. TRAINING AND COMPETENCY.....	328
4.1. General Requirements	328
4.2. General training and induction	329
4.2.1. Induction Training.....	329
4.2.2. Safety meetings / Pre-job briefings.....	329
4.2.3. Toolbox talks	329
4.2.4. Safety operation and training	329
4.3. Competency training.....	330
5. ACTIVITY-BASED PREVENTION PLAN FOR TRANSMISSION AND DISTRIBUTION LINES	331
5.2. Foundation works, excavation, and trenching	331
5.2.1. Excavation safety plan	331
5.2.2. PPE during foundation works	331
5.2.3. Protection from water accumulation hazards.....	331
5.3. Poles erection protection plan and working at height.	332
5.3.1. Poles Erection Plan.....	332
5.3.2. Safety while working at heights and permanent attachment.....	332
5.4. Stringing works.....	333
5.5. Stringing protection plan.....	333
5.6. Earthing	333
5.7. Barricades and traffic control plans.....	334
6. EMERGENCY PREPAREDNESS REQUIREMENTS	334
6.2. Initial actions.....	334
6.3. Emergency procedures	334
6.4. Notifications procedure.....	334
6.5. Emergency equipment and tools.....	335
6.5.1. First aid kit.....	335
6.5.2. Fire extinguisher.....	335
6.6. Medical Emergency Response Procedures	335
6.7. Fire Response Procedures.....	336
6.8. Site Waste Disposal & Management	336
6. REPORTING AND DOCUMENTATION.....	337
6.1. Reporting and monitoring	337
6.1.1. Contractor Monthly Reporting	337
6.1.2. Quarterly Reporting	337
6.2. Managing Changes	338
6.3. Documentation and document control	338
6.4. Control of Documents	338
7. STAKEHOLDERS ENGAGEMENT AND GRIEVANCE MECHANISM	339
7.2. Engagement Dimensions.....	339
7.3. Communication	339
7.4. Participation and consultation.....	340
7.5. Grievance Mechanism	340
8. CONCLUSION	341

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	302
1. INTRODUCTION	307
1.1. Objective of Occupational Health and Safety Plan	307
1.3. Project Location and Activities	307
1.3.1. Design and construction phases.	308
1.3.2. Operation phase and Maintenance of the RoW	308
1.3.3. Decommissioning phase	308
2. POLICY STATEMENT, ROLES, AND RESPONSIBILITIES	309
2.1. Occupational Health and Safety Policy Statement	309
2.2. Zero accident policy	309
2.3. Incident readiness	309
2.4. Personal initiative empowerment	310
2.5. Continuous Improvement	310
2.6. OHSP Management team and responsibilities	310
2.6.1. Project Manager	310
2.6.2. Site Manager	311
2.6.3. Site Supervisors/ Foremen	311
3. OCCUPATIONAL HEALTH AND SAFETY PROCEDURES	312
3.1. Identification and Evaluation of Risks	312
3.1.1. Risk identification	313
3.1.2. Method of evaluation	313
3.1.3. Hazard identification	313
3.2. Risk assessment and Management.	314
3.2.1. Safety Inspections	314
3.2.2. Job hazard analysis	314
3.2.3. Stop work authority.	315
3.3. Personal Protective Equipment	315
3.3.1. Appropriate personnel protective equipment	315
3.3.2. Type of Personal Protective Equipment (PPE)	315
3.3.3. PPE for working at Heights.	316
3.3.4. PPE maintenance and storage	316
3.3. Signs and markings	317
3.4. Incident and accidents management	318
3.4.1. Incident Notification and Reporting	318
3.4.2. Injury and accident management	318
3.4.3. First Aid and Emergency Medical	319
3.4.4. Incident report and notification	319
3.4.5. Contact information:	320
3.4.6. Communication	321
3.5. Material and works handling.	321
3.5.1. Electrical facilities and installation	321
3.5.2. Load handling.	322
3.5.3. Lifting equipment	323
3.5.4. Walking and working surfaces.	323
3.5.5. Ladders handling	323
3.6. Work at heights	324
3.6.1. General requirements	324
3.7. Fire prevention and protection.	325
3.8. Site roads and transport of material	326
3.8.1. Work on roads.	326
3.8.2. Driving, traffic, and transport Safety	326

3.8.3. Heavy motor vehicles	326
3.8.4. Light vehicle operations	327
3.9. Housekeeping, Tools, and equipment handling	327
3.9.1. Housekeeping	327
3.9.2. Slips, trips, and falls	327
3.9.3. Tools and equipment	327
3.9.4. Hazard material awareness	328
3.10. Alcohol and Drug Control Plan	328
4. TRAINING AND COMPETENCY	328
4.1. General Requirements	328
4.2. General training and induction	329
4.2.1. Induction Training	329
4.2.2. Safety meetings / Pre-job briefings	329
4.2.3. Toolbox talks	329
4.2.4. Safety operation and training	329
4.3. Competency training	330
5. ACTIVITY-BASED PREVENTION PLAN FOR TRANSMISSION AND DISTRIBUTION LINES	331
5.2. Foundation works, excavation, and trenching	331
5.2.1. Excavation safety plan	331
5.2.2. PPE during foundation works	331
5.2.3. Protection from water accumulation hazards	331
5.3. Poles erection protection plan and working at height.	332
5.3.1. Poles Erection Plan	332
5.3.2. Safety while working at heights and permanent attachment.	332
5.4. Stringing works	333
5.5. Stringing protection plan	333
5.6. Earthing	333
5.7. Barricades and traffic control plans	334
6. EMERGENCY PREPAREDNESS REQUIREMENTS	334
6.2. Initial actions	334
6.3. Emergency procedures	334
6.4. Notifications procedure	334
6.5. Emergency equipment and tools	335
6.5.1. First aid kit	335
6.5.2. Fire extinguisher.	335
6.6. Medical Emergency Response Procedures	335
6.7. Fire Response Procedures	336
6.8. Site Waste Disposal & Management	336
6. REPORTING AND DOCUMENTATION	337
6.1. Reporting and monitoring	337
6.1.1. Contractor Monthly Reporting	337
6.1.2. Quarterly Reporting	337
6.2. Managing Changes	338
6.3. Documentation and document control	338
6.4. Control of Documents	338
7. STAKEHOLDERS ENGAGEMENT AND GRIEVANCE MECHANISM	339
7.2. Engagement Dimensions	339
7.3. Communication	339
7.4. Participation and consultation	340
7.5. Grievance Mechanism	340
8. CONCLUSION	341

ACRONYMS AND ABBREVIATIONS

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

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 Southern Province 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.

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 Southern Province 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 Southern province 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.

1.5. 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.

1.5.1. 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 communicate information 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 cause harm. 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 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 conditions for 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 ensure that 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;
- **Appropriate 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.

3.3.2. 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.

3.3.3. 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.

3.3.4. 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.

3.3.5. 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.

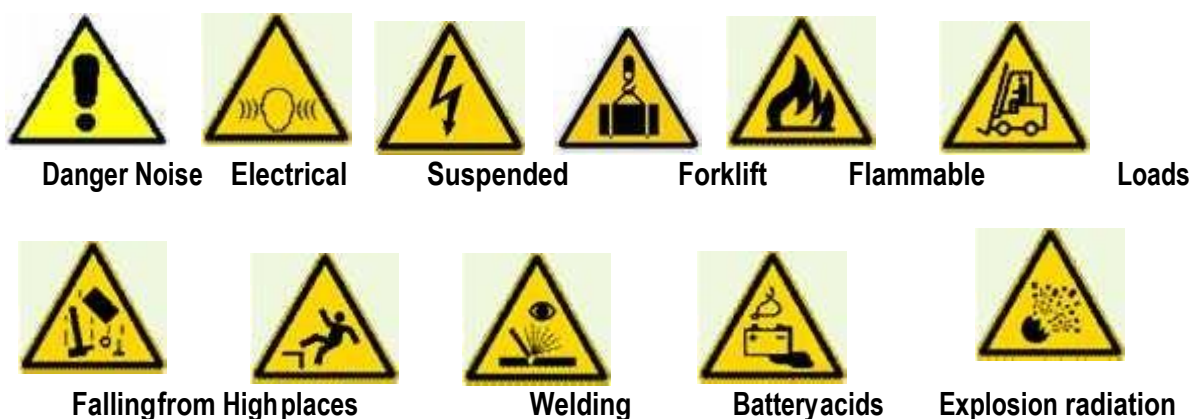
- ✓ All persons have a responsibility to verify the conditions of PPE before and after use to detect defects.
- ✓ All persons using a fall protection system must be trained on the safe use of the system including Proper fit, wear, inspection, limitations, and care of the system. Fall protection systems 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.



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.



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).



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-controlled worksites 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 EDCL controlled 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 a 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 equipped 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 prevent 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 m and 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 conducting any 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 one worker.
- ✓ **Rope Grab:** 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

3.6.2. 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 recognized international standard;
- ✓ 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;
- ✓ 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 and dismantling. 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;
- Keep all the firefighting equipment clear of obstructions.;
- Provide easy access to firefighting equipment 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 any sources 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 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 chocked, 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 any tripping, 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 of workers (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 drugs. It 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 and those 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 to carry 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 77: 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
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 plan 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 reporting incidents 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 if such 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 is otherwise 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 erection. 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 chinstraps 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 and equipment;
- 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 the stringing 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 that a 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

6.1. 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.

6.2. 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	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 to 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.

6.3. 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.

6.4. Emergency equipment and tools

6.4.1. 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.
-

6.4.2. 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.

6.5. 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 the injured 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.

6.6. 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).

6.7. 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 recycling should 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 the construction 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.

6.7.1. Non-hazardous waste

All waste will be removed from the site and transported to an approved disposal area. A certificate of safe disposal will 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.

6.7.2. 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 exposure during 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. All employees involved in the collection, transport, and disposal of Hazardous substances are to be provided with 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.

7.1. 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.

7.2. 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.

7.3. 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;

7.4. 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 Environmental and Social 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 southern province 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.