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RWANDA RENEWABLE ENERGY FUND PROJECT

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)

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GLOSSARY OF TERMS

Cumulative impacts/effects: The total effects on the same aspect of the environment resulting from a number of activities or projects.

Developer/Proponent/Sponsor: the entity – person/ company/agency – proposing to develop/implement/install a new project/sub- project or expand an existing project under the Renewable Energy Project

Direct impacts: An effect on the environment brought about directly by the Renewable Energy Project

Disclosure: Information availability to all stakeholders at all stages of the development of projects.

Environment: physical, biological and social components and processes that define our surroundings.

Environmental and Social Impact Assessment (ESIA): A comprehensive analysis of the project and its effects (positive and negative) on the environment and a description of the mitigative actions that will be carried out in order to avoid or minimize these effects.

Environmental Monitoring: The process of examining a project on a regular basis to ensure that it is in compliance with an Environmental Management Plan (EMP), or the Government of Rwanda (GoR) Environmental Impact Assessment (EIA) certification of approval conditions and / or environmental prescriptions.

Impact: A positive or negative effect that a project has on an aspect of the environment.

Indirect impact: A positive or negative effect that a project indirectly has on an aspect of the environment.

Involuntary resettlement: The forceful loss of land resources that requires individuals, families and / or groups to move and resettle elsewhere.

Mitigation measures: The actions identified in an EIA to negate or minimize the negative environmental impact that a project may have on the environment.

Project and sub-project: a set of planned activities designed to achieve specific objectives within a given area and time frame.

Project Brief: The initial submitted document to RDB to initiate the process that will lead to the issuance of the EIA certificate of approval.

Scoping: The initial stage in an environmental assessment that determines the likely major environmental parameters that will be affected and the aspects of the project that will bring upon these effects

Significant effect: An important impact on an aspect of the environment

Potential environmental and social impacts are defined as follows: -

Positive Impact*:* A change which improves the quality of the environment (for example by increasing species diversity; or improving the reproductive capacity of an ecosystem; or removing nuisances; or improving amenities)

Neutral Impact: A change which does not affect the quality of the environment

Negative Impact: A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance). The potential adverse impacts of the project fall under two broad categories of bio-physical (natural) and socio-economic environments

Stakeholder: Any person or group that has an interest in the project, and the environmental effects that the project may bring about

ACRONYMS & ABBREVIATIONS

BoD	Board of Directors
BRD	Development Bank of Rwanda
BTC	Belgian Technical Cooperation
CBOs	Community Based Organizations
CPS	Country Partnership Strategy
DRC	Democratic Republic of Congo
EA	Environmental Assessment
EARP	Electricity Access Rollout Program
EDCL	Energy Development Corporation Limited
EDPRS	Economic Development and Poverty Reduction Strategies
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EnDev	Energizing Development
EO	Environmental Officer
ESIA	Environmental and Social Impact Assessment
ESMA	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
ESMP	Environmental Management Plan
ESMS	Environmental and Social Management System
EUCL	Energy Utility Corporation Limited
FDGs	Focus Group Discussions
FI	Financial Intermediary
GDP	Gross Domestic Product
GoR	Government of Rwanda
GRS	Grievance Redress Service
IDA	International Development Association
IOO	Operations Order
IP	Investment Plan
MININFRA	Ministry of Infrastructure
MTF	Multi-Tier Framework MTF
NGOs	Non-Governmental Organizations
OM	Operations Manual
PDO	Project Development Objective
PIU	Project Implementation Unit
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
RAP	Resettlement Action Plan
RBF	Results-Based Financing
REF	Renewable Energy Fund

REFP	Renewable Energy Fund Project
REG	Rwanda Energy Group
RNRA	Rwanda Natural Resources Authority
RPF	Resettlement Policy Framework
RURA	Rwanda Utilities Regulatory Authority
SACCOs	Savings and Credit Cooperatives
SEMS	Social and Environmental Management System SEMS
SIDA	Swedish International Development Agency
SREP	Scaling Up Renewable Energy Program
(ToRs)	Terms of References
VOC	Volatile Organic Compounds
WBG	World Bank Group's

EXECUTIVE SUMMARY

Program Description

Rwanda is particularly affected by high electricity costs. Cost of service delivery in 2016 was about US$0.30 per kWh, much higher than the sub-Saharan Africa, while electricity tariffs, US$0.21 per kWh on average, are not cost reflective and high compared to other countries in the region. Additionally, the average grid connection is heavily subsidized: out of the close to US$560 connection cost per household, consumers pay an approximately a US$75 connection fee over a two-year period. Limited generation capacity and low efficiency of power supply are among factors that drive electricity costs up.

Low household affordability and, hence, low demand for electricity further hamper Rwanda's energy sector growth. About 46 present of Rwandan households are considered poor[1]; their energy spend is quite low. Yet, households are dominant electricity consumers: they use 51 percent of all energy sold and use it primarily for lighting. As a result, almost half of the utility's consumers currently use less than 20kWh per month (against a minimum of 130 kWh per month to make the connection financially viable[2]); a large proportion of the population cannot afford their connection.

The GoR has an ambitious target to increase electricity access to 70 percent by mid-2018.[3,4] In its second EDPRS, approved in Mary 2013, GoR aims to put the country onto a higher growth trajectory in order to achieve middle-income status by 2020; 70 percent access to electricity by 2018 and 100 percent access by 2020 are essential EDPRS targets.

In view of this, in May, 2016 the GoR approved a Rural Electrification Strategy that integrates on-grid and off-grid solutions and promotes private-sector investment in areas where extending the grid is not financially viable in the short term.

Few developers are providing mini-grid electricity services despite the existence of an encouraging legal and regulatory framework for mini-grids. Increasing off-grid energy access will require addressing issues of affordability and access to finance in Rwanda. In terms of consumer affordability, local Savings and Credit Cooperatives (SACCOs) and commercial banks have yet to play any meaningful role in the off-grid sector. Rwandan SACCOs have virtually no experience in issuing loans for solar products and have

[1] In Rwanda, all households are categorized into 'Ubudehe' categories. There are four Ubudehe categories, with Ubudehe 1 (16% of Rwandan households) being the poorest/most vulnerable and Ubudehe 2 (30% of households) – poor.

[2] Energy Sector Strategic Plan, 2015.

[3] Energy Sector Strategic Plan also targets that 100 percent of schools and hospitals will have access to electricity by 2018.

[4] Given the projected rate of population growth and decreases in average household size estimated by the National Institute of Statistics Rwanda, the number of households is expected to increase by over 100,000 annually over the short to medium term. This, in effect, makes the 70 percent electrification goal a 'moving target'.

therefore been unable to address affordability challenges faced by their members for these types of energy services. Rwandan banks, as the vast majority of commercial banks in sub-Saharan Africa, have stringent requirement for large amounts of additional collateral, which limits their servicing to wealthier and/or larger, well-established clients. Several off-grid solar companies have tailored their business models to address affordability of customers through pay-as-you-go business models, extending credit to their customers in order to allow them to pay for the systems in more affordable monthly instalments (instead of a lump-sum purchase). Mini-grid developers have been relying primarily on donor funding to make electricity services affordable to customers who are, in general, poorer than those in grid-served areas.

Donors have been providing some support to the development of the Rwandan off-grid market. GIZ remains one of the most active supporters via its Energizing Development (EnDev) program, which is providing results-based financing to solar companies (€3.4 million) and viability-gap financing to mini-grid developers (€1.8 million), targeting over 100,000 household connections. The EU has provided a grant (€6 million) to solar company Mobisol to deliver off-grid solar services to 49,000 households. Off Grid Elelectric has raised $7.5MM of debt for Rwandan expansion. Additionally, donor countries have funded various smaller, standalone solar system support programs targeting modest numbers of household connections, typically through grants or direct program funding. So far, existing donor support has not been enough to catalyze off-grid market growth to the extent envisioned by the GoR.

In November, 2016, the Scaling Up Renewable Energy Program (SREP)[5] approved the Rwanda Investment Plan (IP), developed and presented by GoR, with an allocation of US$50 million. The objective of Rwanda's SREP IP is to accelerate growth of off-grid electricity access through standalone solar systems and renewable energy-based mini-grids. The IP aims to catalyze private investments in provision of off-grid electricity services through the establishment of a Renewable Energy Fund (REF), particularly targeting stand-alone solar systems and mini-grids. The World Bank is the leading institution in managing SREP funds in Rwanda.

The proposed SREP-funded Renewable Energy Fund (REF) Project will directly support the implementation of RES's Program 2 (risk-mitigation facility to incentivize private sector participation in off-grid solar space) and Program 3 (development of mini-grids by private sector). The REF is expected to increase off-grid energy access in Rwanda through effectively addressing consumer affordability and access to finance challenges, thus facilitating achievement of GoR's off-grid access targets. GoR envisions the proposed project as a pilot that could be scaled up into a primary mechanism for directing funds and technical assistance to the off-grid electricity sector, eventually attracting additional financing for rural electrification from other development partners and the private sector.

[5] SREP is a multi-donor trust fund under the framework of the Climate Investment Funds.

The project is fully aligned with Rwanda's national and energy sector priorities. Increased access, reliability, and cost of energy services are among the GoR's main objectives under the country's Vision 2020 and the second EDPRS, which supports implementation of the Vision 2020. ESDPRS identifies rural development as a key thematic area and sets a target of increasing electricity access to 70 percent by mid-2018 through a combination of on-grid and off-grid solutions. Furthermore, the project will support implementation of the RES, which recognizes a prominent role for off-grid technologies in achieving the 70 percent access target.

Project Development Objective

The Project Development Objective (PDO) is to increase electricity access in Rwanda through off-grid technologies and facilitate private-sector participation in renewable off-grid electrification.

Components

Component 1: Line of credit and direct financing for off-grid electrification

This component will set up and operationalize a REFP, a local-currency line of credit and direct financing facility that will help address access to finance and affordability constraints in Rwanda in order to accelerate growth of the off-grid electrification market. The REF will provide lines of credit to local financial institutions for sub-loans to households and micro, small and medium enterprises, as well as direct loans to private companies engaged in off-grid electrification (mini-grid developers and potentially locally-registered off-grid solar companies). The REFP will use existing country systems to facilitate access to finance for households and businesses, improve affordability of solar electricity services, and maximize geographic coverage.

The REFP will provide access to local-currency financing through the four financing windows described below. This will allow the facilitation of off-grid market development through mobilization of all the key market enablers at the same time: SACCOs, banks (commercial and microfinance), and private companies (mini-grid developers and potentially locally-registered off-grid solar companies).

Component 2: Technical assistance, capacity building and project implementation support

This component will provide necessary technical assistance and capacity building to BRD and participating entities (SACCOs, banks, and private companies engaged in off-grid electrification) as well as provide project implementation support to BRD as host of the facility. Technical assistance and capacity building will include, among others: (i) capacity building and awareness workshops for SACCOs, banks, and private companies engaged in off-grid electrification to facilitate partnerships between SACCOs, banks, and the private sector; (ii) technical assistance and capacity building for participating SACCOs and banks to ensure their successful partnerships with the private sector; (iii) capacity building of participating SACCOs and banks to manage energy credit lines (including management, operational, and monitoring and evaluation capacities); (iv) capacity building of the Energy Division of BRD to manage direct energy lending; (v) technical assistance to BRD to develop pipeline of mini-grids projects; and (vi) technical

assistance and capacity building for BRD and participating entities on quality assurance and enforcement of technical standards for off-grid solar systems, etc.

Project implementation support will include, among others: (i) establishment of the Project Implementation Unit (PIU) and provision of operational support to the PIU in the areas of project management, supervision, and monitoring; (ii) outreach to key off-grid market enablers-potential direct project beneficiaries; (iii) knowledge-sharing events between participating project entities; (iv) sector-wide knowledge-sharing and project results dissemination workshops; (v) preparation of required studies related to the project, including impact assessment; (vi) preparation of consolidated annual project audits; and (vii) financing of incremental operating costs, etc. Cooperation and co-financing opportunities with other donors, e.g., Belgian Technical Cooperation (BTC), GIZ, Swedish International Development Agency (SIDA), will be explored.

Project Financing

The US$48.94 million project will be financed by the SREP Trust Fund. The SREP funding is comprised of a US$21.4 million grant; and a US$27.5 million loan extended with a service charge of 0.1 percent per annum on the disbursed and outstanding loan balance and 40-year maturity, including a 10-year grace period, with principal repayments at two percent for years 11-20 and four percent for years 21-40. Principal and service charge payments accrue semi-annually. The funds will be transferred (grant portion)/ on-lent (loan portion) by the GoR to the BRD.

Component 1 will involve civil works specifically during the construction of mini grids and thus trigger the environmental assessment policy (OP.4.01). Given that this is a financial intermediary (FI) project, the Environmental Category assigned to this Project is Category FI.

Project Beneficiaries

The final project beneficiaries are Rwandan households and businesses which will gain access to off-grid electricity services through solar systems or mini-grids and whose use of electricity will replace consumption of diesel, kerosene, and dry cell batteries as well as other alternative fuels. The direct project beneficiaries include (i) participating SACCOs and commercial banks, which will gain knowledge and experience in lending in a new sector; (ii) mini-grid developers who will gain access to finance to build mini-grids; and (iii) private companies engaged in off-grid electrification (mini-grid developers and potentially locally-registered off-grid solar companies), which will get access to financing for expanding their businesses in Rwanda as well as gain experience of working with local financial institutions. The Development Bank of Rwanda (BRD) will also benefit from capacity building in energy lending.

Justification for ESMF

As many specific project investments in the REFP have not been clearly identified at this stage, hence an ESMF provides a general impact identification framework to assist project implementers to screen the projects and institute measures to address adverse environmental and social impacts. This ESMF thus applies to all sub projects to be financed under REP. Specific information on country- wide project locations, land requirements, bio- physical features etc. when known at a later stage will trigger the preparation of Environmental and Social Impact Assessment (ESIA) reports.

Policy, Legal and Institutional Issues

The following legal instruments were reviewed with respect to environmental and social assessment and management.

- Constitution of Rwanda
- Organic law
- Expropriation law
- Labor Code

Environmental and Social Requirements

In order to reduce, minimise and mitigate adverse impacts and undue harm of its development projects to the environment, all bank-financed projects are guided by environmental and social policies and procedures commonly referred to as safeguards instruments. The following banks' policies[6] have been triggered as a result of this project and they include:

1. OP 4.01 (Environmental Assessment),
2. OP 4.12 (Involuntary Resettlement),
3. OP 4.04 (Natural Habitats)
4. OP 4.11 (Physical Cultural Resources)

All safeguards policies of the World Bank require that, before a sub project is appraised, an Environmental and Social Impact Assessment (ESIA) containing an Environmental Management Plan (ESMP), or just an EMP, and if the project requires it, a Resettlement Action Plan (RAP), Physical Cultural Resources Plan (PCRP) be made available for public review at a place accessible to local people in a form, manner, and language they can understand. All necessary safeguard documents that will be locally disclosed will also be forwarded to the Bank for disclosure at the Bank's external website.

[6] The World Bank Safeguard Operational Policies (OPs) are OP4.01 – Environmental Assessment; OP4.04 – Natural Habitats; OP4.09 – Pest Management; OP4.10 Indigenous Peoples; OP4.11 – Physical Cultural Resources; OP4.12 – Involuntary Resettlement; OP4.36 – Forests; OP4.37 Safety of Dams; OP7.50 – Projects on International Waterways; and OP7.60 – Projects in Disputed Areas. See www.worldbank.org/safeguards for more information.

Environmental and Social Impacts

Loss of vegetation

There will be vegetation loss (site specific) during the construction phase for hydro mini grids either to pave way for actual project construction among others. The vegetation will be cleared so that the area where the construction work is to take place is clear for the construction work to be performed. The construction works (associated with mini grid development) may also involve direct land take of productive pasture land and agricultural lands, bush clearing, removal of top soil, excavation and mass haulage. These activities will expose the land to elements of erosion such as wind and water and thus will trigger the process of land degradation.

Decreased Air Quality

Airborne dust will be caused by excavation, vehicle movement hence engine combustion and materials handling, particularly downwind from the construction sites during the construction phase of the identified investments. Uncovered stock piles and asphalt mixing plant operations are another source of dust. Air pollution will be further caused by emissions from vehicles and construction machinery. There will be decreased air quality due to dust, suspended particles, hydrocarbon vapours, oxides of nitrogen and sulphur (NOx and SOx) and Volatile Organic Compounds (VOC) among other emissions.

Water Quality Degradation

The project civil works are likely to alter the water quality in the local water mainly due to site clearing and the disruption of the natural drainage patterns. The construction phase of the project may encourage increased water turbidity within the water body where the mini grids will be located. There will also be potential water contamination from hydrocarbons mainly from the contractor's machineries.

Hydrology Impacts

Mini grid construction activities may manifest in impacts to the local hydrology. Mini grid construction may interrupt the river system resulting to direct consequence of change in the river flow patterns, sediment transport as well as change in the river discharge pattern downstream of the dam. Change in the river hydrology may consequently also have an effect on the aquatic habitat such as an impact of fish breeding and migration hence habitat loss.

Sedimentation

The construction of mini grids shall involve earth moving within the river flood plains and sections of the adjoining riverbanks and lands. This loosening of the soil and the steep slope terrain will create a situation where any heavy rains will freely wash down the silt into the downstream areas. The silt when washed down may contain high levels of organic matter and deposition of this may lead to anoxic conditions in the lower water levels with potential risks to the associated aquatic life.

Noise and Vibration Impacts
Construction activities of the mini grids could result in noise impacts so as to impact on general well-being, health and functioning. Infrastructure developments related to the mini grids may involve the use of construction equipment (graders, drilling equipment, trucks, tractors and excavators) for among others blasting, excavation, asphalt mixing plant operations and vehicular movement that emit noise usually harmful to the environment.

Road Safety, Traffic Management and Access
Traffic congestion from construction phases of mini grids could potentially cause disruption, health and safety impacts, as well as economic impacts. The use of heavy moving construction vehicles and machineries in project sites is generally known to cause traffic reducing movement and flow of vehicles and sometimes road accidents are associated with construction sites. Public access is likely to be compromised and restricted during construction activities.

Construction Solid and Effluent Waste
Solid waste issue is a potential adverse impact that will be as a result of abandonment of litter/construction materials on site. Solid waste from solar installation will be limited and insignificant during installation phase. Construction activities related to mini grids may however generate solid wastes that may adversely affect the environment.

Obsolete Solar Batteries Waste
The main environmental, health and safety concerns are likely to be associated with recycle and disposal of spent batteries at the end of their useful lives, which is usually three to five years after deployment. Rechargeable batteries for storing solar energy may run on nickel-cadmium (Ni-Cad), nickel metal hydride (NiMH), lithium-ion (Li-ion), lead-acid (Pb-A), or lead-gel (Pb-gel). These batteries should not be disposed in standard landfills because they can create long lasting environmental and human health impacts (e.g., headaches, abdominal discomfort, seizures and comas, cancers, irritation of skin and respiratory system, burns and damage to skin and eyes, corrosion, etc.) due largely to the heavy metals such as mercury, lead, cadmium and nickel, and acids. The entire management processes including de-manufacturing, collection, storage, recycling, transport and disposal may present a challenge to this project, given the scope of this Bank operation.

Visual Intrusion
Unsightly earthworks and borrow pits during construction may be a source of visual related impacts especially through scarring of landscapes. Construction activities related to hydro mini grids may have visual related impacts.

Downstream Impacts
Changes to the low flow regime may have significant negative impacts on downstream users. Minimum demands from both existing and potential future users need to be clearly identified and assessed in relation to current and future low flows. The quality of low

flows is also important. A reduction in the natural river flow together with a discharge of lower quality drainage water can have severe negative impacts on downstream users.

Habitats both within and alongside rivers are particularly rich, often supporting a high diversity of species. Large changes to low flows (±20%) will alter micro-habitats of which wetlands are a special case. It is particularly important to identify any endangered species and determine the impact of any changes on their survival. Such species are often endangered because of their restrictive ecological requirements. The ecology of estuaries is sensitive to the salinity of the water which may be determined by the low flows. Saline intrusion into the estuary will also affect drinking water supplies and fish catches. It may also create breeding places for anopheline vectors of malaria that breed in brackish water.

As a result, in the cumulative impact analysis which would be done for each investment the impact of a given project on those people should be considered. The most important mitigation measures are the release of good quality Reserve Flows capable of maintaining important environmental services, and satisfying downstream water requirements.

Borrow Pits and Quarry Sites

Borrow pits and quarry are sites where stone, sand, gravel, till, clay, or other granular soils are extracted for construction of the hydro-mini-grids. Environmental and social impacts of pit and quarry development can include the loss, reduction or disturbance to wildlife and habitat, erosion, dust, soil/groundwater contamination, damage to historic resources, waste disposal, noise, and aesthetics.

Social Impacts

Public Health

There is a potential risk that the construction process for most of the investment projects could increase HIV/AIDS prevalence in the project areas especially through interactions of the locals with the labour forces. Increase in risk of sexually transmitted diseases, such as HIV/AIDS etc. due to influx of migrant workers; solid waste and effluent discharge from construction camps; risk of increase in vectors of *schistosomiasis, river blindness, Lymphatic filariasis (elephantiasis)* and malaria due to stagnant water associated with construction works/borrow pits etc.

Loss of Land

There may be loss of farmland, grazing land, business and structures among others as a result of the construction of mini grids. Construction of mini grids even though not mega in scale is associated with land take. The existing land use of the project area will be affected by the construction activities. The degree of land acquisition may however be low due to the scale of the mini grids.

Labor Influx Impacts

The influx of workers and followers can lead to adverse social and environmental impacts on local communities, especially if the communities are rural, remote or small. Such adverse impacts may include increased demand and competition for local social and health services, as well as for goods and services, which can lead to price hikes and

crowding out of local consumers, increased volume of traffic and higher risk of accidents, increased demands on the ecosystem and natural resources, social conflicts within and between communities, increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime. Such adverse impacts are usually amplified by local-level low capacity to manage and absorb the incoming labor force, and specifically when civil works are carried out in, or near, vulnerable communities and in other high-risk situations.

The increase in the number of people in a specific project area or site especially during construction has the potential to lead to a number of negative socio-economic impacts, including increased insecurity and community conflicts, increased incidences of diseases; increased risk of accidents and occupational hazards; and immigration of construction workers and labour force management challenges. The construction activities of sub project investments may require recruitment of "foreign" skilled and unskilled labour that could trigger conflict, resentment and tension by the local communities over perceived inequities in distribution of job opportunities by the local communities.

Table 1: Summary of Adverse Impacts and Mitigation Measures

Impacts	Description of mitigation measures
Physical Environment	
Solid and Effluent Waste	Solid nontoxic waste Adequate waste receptacles and facilities should be provided at project sites/camp sites Training and awareness on Safe Waste Disposal in construction camps for all workers Final disposal should be at dumpsites approved by the REMA Waste oil /fuel Spent or waste oil from vehicles and equipment should be collected and temporarily stored in drums or containers at site Waste oil should be disposed of by oil marketing companies or agents approved or recognized and have the capacity to undertake oil disposal Prepare Waste Disposal Plan for every construction site Install waste disposal receptacles and signs in strategic places within the construction camps Provide training and awareness on need to avoid littering Ensure the construction camps have toilets and connected to the sewer system Spent Batteries Ensure that spent batteries are disposed or recycled in an environmentally sound manner
Decreased Air Quality	Proposed investments should require that construction contractors operate only well maintained engines, vehicles, trucks and equipment. A routine maintenance program for all equipment, vehicles, trucks and power generating engines should be in place. The project should ensure the use of good quality fuel and lubricants only If dust generation at the project/construction site becomes a problem, limited wetting of sites and or unloading and reloading points should be done to reduce dust raising

	Construction traffic speed control measures should be enforced on unpaved roads (speed limits through communities should be ≤50km/hr on unpaved roads and near or at project site should be ≤30 km/hr). Engines of vehicles/trucks and earth-moving equipment should be switched off when not in use.
Noise and vibration	Proposed investments should require contractors to use equipment and vehicles that are in good working order, well maintained, and that have some noise suppression equipment (e.g. mufflers, noise baffles) intact and in working order. This will be achieved by making it a component of contractual agreements with the construction contractors. Contractors will be required to implement best driving practices when approaching and leaving the site (speed limit of ≤30 km/hr) to minimize noise generation created through activities such as unnecessary acceleration and breaking squeal. Engines of vehicles/trucks and earth-moving equipment should be switched off when not in use.
Visual Impacts	Landscaping of facilities after construction and restoration of disturbed areas e.g. borrow pits
Impact on traffic and public safety	Only road worthy vehicles and trucks should be used to avoid frequent breakdowns on the roads Only experienced drivers should be employed Contractors must provide training for drivers; Establish speed limits; Enforce safe driving and take disciplinary action against repeat offenders
Water Abstraction	Obtain water abstraction permits from the Water Regulatory Authority
Decreased Water Quality	No garbage/refuse, oily wastes, fuels/waste oils should be discharged into drains or onto site grounds Fuel storage tanks/sites should be properly secured to contain any spillage Maintenance and cleaning of vehicles, trucks and equipment should take place offsite especially where project sites are close to water bodies. Toilet facilities should be provided for construction workers to avoid indiscriminate defecation in nearby bush or local water bodies
Soil Erosion	Minimize land clearing areas as much as possible to avoid unnecessary exposure of bare ground to the elements of the weather Re-vegetate cleared areas as early as possible using native plant species As much as possible, avoid construction work in the rainy season
Impact on fauna and habitat	Avoid unnecessary exposure and access to sensitive habitat areas For identified or suspected sensitive habitats (swamps/ wetlands), regular inspection or monitoring should be carried out in the area prior to start and during work. If sensitive habitats are encountered, Project activities should cease and the Project should consult wildlife to determine the appropriate course of action. Prohibition on hunting and consumption of bush meat by workforces Proposed investments should require that contractors implement a hazardous

	materials management plan that includes specification for proper storage and handling of fuels, oil, wastes, and other potentially hazardous materials as well as a plan for containment and clean-up of accidental spills into the aquatic environment. During pre-installation and installation of project facilities, spotting of sensitive aquatic mammals should form part of the project activities. Should these species be observed in the vicinity of the work area, the project should execute measures to avoid destruction or disturbance. Ensure provision for water flow reserves and appropriate reservoir filling schedules Project staff must report sightings of any injured or dead aquatic life (fishes)/ mammals immediately, regardless of whether the injury or death is caused by a Project activity. The Project workforce and local communities should be educated to ensure that the importance of environmental protection and nature conservation are effectively communicated and that wider appreciation of environmental issues and construction best practice are fostered.
Downstream Impacts of mini-grids	Maintain environmental flow reserves for the river,
Quarry Site Impacts	Identify borrow and quarry sites away from sensitive environments and develop quarry management and rehabilitation plans.
Hydrology Impacts/Changes	Maintain environmental flow reserves for the river, Do into retain water in reservoir during drought, ensure that water retention in dam is controlled to ensure that adequate reserve is left to flow downstream for users
Social Environment	
Physical displacement	All affected persons to be given relocation assistance (cash or kind) by the Project to enable them move their properties to new locations, i.e. in accordance with the Resettlement Policy Framework (RPF) Resettlement Plans will be required. If a site is acquired, the State may relocate persons and their families as well as community facilities to be affected. The affected families should not be made to incur any cost during the relocation period. A resettlement plan should be prepared for this area with the RPF as a guide.
Loss of employment and livelihoods	Those whose livelihood is affected should be assisted to ensure they will not be worse off as a result of the project. This can include livelihood assistance, provision of new jobs immediately without any loss of income. The social assessments and socio-economic surveys, which will be undertaken for the preparation of individual investments/subprojects as well as the resettlement action plans, should assess these issues and provide measures in accordance with the Resettlement Policy Framework (RPF). Contractors should use local labor as much as possible and where available. As much as possible, all unskilled labor should be contracted or obtained from the local community.
Loss of land and other assets	Due process should be followed to establish the true owner of any land, be it family or communal land. Once established, the project should acquire the site by paying appropriate compensation in accordance with the resettlement policy framework (RPF), which would be the replacement cost of the assets lost.
Loss of structures/properties	For a project site to be used, irrespective of the land ownership, appropriate compensation should be paid for any structures/ properties which are permanent structures at the site as well as investment made for any development on the land. Depreciation should not be factored during valuation of these properties. The compensation process should satisfy the RPF developed for the project.

	Appropriate compensation should be paid for any damaged or destroyed propriety that belongs to affected persons. No depreciation during valuation of these properties.
Impact on access among communities living in the project areas	Measures will be considered in the projects' design to ensure that communities are not divided and if they are as a result of a project appropriate measures are taken to mitigate this impact.
Impacts on recreation and public areas	Appropriate notices and warning signs will be erected around working areas and public areas to warn prospective trespassers of any danger or risk
Impacts on human health/ traffic safety and sanitation	Trucks carrying construction materials such as sand, quarry dust, laterite etc. will have the buckets covered with tarpaulin or appropriate polythene material from or to project site Only road worthy vehicles/trucks should be used Only experienced drivers/operators should be employed Except for areas secured by fencing, all active construction areas will be marked with high-visibility tape to reduce the risk accidents involving pedestrians and vehicles. All open trenches and excavated areas will be backfilled as soon as possible after construction has been completed. Access to open trenches and excavated areas will be secured to prevent pedestrians or vehicles from falling in. Adequate sanitary facilities will be available for workers and open range defecation will not be countenanced. Construction workers will be provided with and educated to wear suitable Personal Protective Equipment (PPE) including hard hats, overalls, high-visibility vests, safety boots, earplugs, gloves etc. Enforce use of PPEs at all times for all staff and labourers and ensure supervision of the same to minimise accidents Construction workers should be educated to adhere to basic rules with regard to protection of public health, including most importantly hygiene and disease (HIV/AIDS) prevention.
Impacts on cultural heritage / archaeological interest / existing ecologically sensitive areas	The pre-construction surveys should identify cultural heritage resources and existing ecologically sensitive areas that the project should avoid and by-pass these resources. The Project should implement a chance find procedure and reporting system to be used by contractors in the event that a cultural heritage feature or ecologically sensitive item/issue is encountered.
Impacts on human health and public safety	The Project will require all contractors to implement an Environmental, Health and Safety (EHS) plan which will outline procedures for avoiding health and safety incidents and for emergency medical treatment. This will be achieved by making it a component of contractual agreement. Contractors will be required to wear suitable Personal Protective Equipment (PPE) including hard hats, high-visibility vests, safety boots and gloves and life vests as appropriate in accordance with the EHS plan. Enforce use of PPEs at all times for all staff and labourers and ensure supervision of the same to minimise accidents All construction and other workers will be sufficiently trained in the safe methods pertaining to their area of work to avoid injuries.
Labor Influx Management	Develop site-specific measures before the contractor starts work, and update them as necessary to reflect project developments. Overall, adequate monitoring and adaptive management of the potential impacts from labor influx are key to properly addressing them and mitigating risks. Recruit as many local workers from the areas as possible. Provide training for the local

	communities to acquire skills needed for work opportunities if there is reasonable time especially on monitoring and maintenance. Develop a Labour Influx Management Plan and Workers Camp Management Plan for all projects. Outline the contractors responsibilities on influx management in contracts.
Impact on gender access to water for household use and household plots as well as impact on pastoralists and fisheries.	The project will take into consideration the different needs for water and types of access which will be affected for each of these groups and provide relevant mitigation measures which will be decided with those affected. Some mitigation measures could include water points for household use and livestock; livelihood assistance to those whose whole or partial livelihood will be affected as a result of some of the possible investments such as dams. Specific impact and relevant measures will be covered by project specific social assessment.
HIV/AIDS Spread and other related public health diseases – Water borne diseases etc.	Design HIV/AIDS awareness, sensitisation and prevention program for each project that extends to the communities as a whole; Design programs for reducing the spread of water borne diseases like Malaria, Bilharzia etc. in collaboration with the Ministry of Health
Labour and employment related impacts	Ensure that the local communities are given priority in relation to employment and provided with training (skilled) to provide future labour in the project e.g. operation and maintenance. Ensure that workers are provided satisfactory working conditions and work environment including pay in accordance with the laws of the country Ensure that child labour is not tolerated in the project; The project to prepare redundancy plans and packages to be discussed with affected workers which will include re- training and re- tooling of affected workers and aim to avoid labor strife

Safeguard Screening Procedures

The project has been rated **Category F1** under the World Bank Operational Policy on Environmental Assessment (OP4.01). This ESMF has been designed to include tools that will be used to screen each proposed sub project investment prior to implementation and contains recommendation on the mitigation measures that need to be adhered to in order to reduce the adverse impacts.

Through the screening process a determination on the safeguards policies triggered by a particular proposed investment will be made and the mitigation measures to put in place outlined. If identified as a requirement of the sub project through the screening process, a Resettlement Action Plan (RAP), is prepared alongside or as an integrated part of the ESMP or ESIA.

Procedure for screening and development of ESIAs

Using this ESMF which is in essence a guide, the development of sub project investment specific Environmental and Social Impact Assessment (ESIAs) will be required for each proposed sub project investment once the nature, scope and location among others of the investments are known in order to ensure compliance with the World Bank safeguards policies. All sub project investments will be screened using the screening forms and a determination will be made using the forms whether an ESIA report is required or otherwise by the Bank. The screening for all sub project investments will be undertaken by BRD.

In order to ensure compliance with the Government of Rwanda environmental regulatory requirements during the feasibility study stage of each investment (specifically the mini hybrid infrastructures), project briefs will be prepared for each sub project investment and submitted to Rwanda Development Board (RDB) for determination as to whether an ESIA is required or not. If RDB makes a determination that an ESIA is required based on the project report submitted, then RDB will assist in the development of Terms of References (ToRs) for follow-up ESIA and Resettlement Action Plan (RAP) which will have to be prepared and submitted to RDB and World Bank for approval before construction works commence. All the ESIA's or ESMP's will be reviewed by the BRD's Social and Environmental Management Systems Coordinator before they are submitted to the RDC and World Bank.

Institutional Implementation Arrangements and Reporting Requirements

BRD will host the Project Implementation Unit (PIU) to successfully fulfil functions described above. PIU will be responsible for monitoring indicators, supervising the credit lines and direct loans, as well as implementation of the necessary technical assistance to the beneficiaries. This includes collecting necessary information from project beneficiaries, assessing and monitoring SACCOs and bank compliance with the respective eligibility criteria, supervision of withdrawal applications and loan books, and reporting on progress during implementation. BRD will also review annual audited financial statements of the intermediaries and conduct periodic on-site supervision to assess compliance and progress. SACCOs and banks will report to BRD on their sub-loan portfolio on a semi-annual basis. To do so, the PIU will have personnel with experience in off-grid energy, project management, procurement, accounting, environmental and social management. Additionally, the PIU will undertake technical due diligence of proposals for mini-grid financing and, if necessary, direct lending to off-grid solar companies with support from specialized technical consultants, institutions with experience in the off-grid energy sector (e.g., EDCL) and donor programs (e.g., EnDev). BRD will receive capacity building and technical assistance to enhance its performance and project implementation capacity. BRD will prepare project (through consultants) specific ESIAs and RAPs and for identified investments during the feasibility study phase of the project following detailed screening and determination that these instruments are needed. All sub projects will be screened.

Capacity Building and Training

BRD has established a robust social and environmental policy prepared in 2013 and an Environmental and Social Management System (ESMS) which is compliant with Rwandan regulatory framework that pertains to the environment, land use, labor health and safety issues, vulnerable and marginalized groups and cultural artefacts. BRD is well equipped with professionals who over the years have received training in environmental and social risk management and therefore should be up to the task under the proposed project

Public Consultations

On 10th February 2017, a consultation workshop was held by BRD targeting stakeholders likely to involved in the project. A total of 48 participants attended the workshop and included representatives from the SACCOs, mini grid developers, solar power investors, regulatory agencies and government ministries. The key issues and concerns from the participants are summarised below.

Issues	Responses
Who will be expected to undertake the ESIA for the sub projects?	SACCOs and mini grid developers will be responsible for preparing their own ESIA reports by engaging a qualified and registered EIA expert.
Who will be responsible for recruitment of environmental and social specialists to prepare the safeguards instruments?	SACCOs and mini grid developers will be responsible for preparing their own ESIA reports by engaging a qualified and registered EIA expert.
Will the solar projects also require preparation of safeguards instruments?	Screening will be required for all sub projects including solar projects in order to determine if further environmental analysis is required.
Will there be a requirement for environmental audit for the sub projects?	In accordance with Organic Law of Rwanda, environmental audits will be required for all projects that are subjected to EIA on an annual basis.
Who will do the screening of subproject?	The initial screening will be done BRD and if it is found that the subprojects are likely to have environmental and social impacts, the developer will be required to submit a project brief to RDB, the institution mandated to determine the level of EIA required.

A detailed issues and response report arising from the consultation of the ESMF are included in the annex A of this document.

1 INTRODUCTION

1.1 Purpose of the ESMF

This ESMF seeks to establish a process of environmental and social screening which will permit the institutions in charge of the implementation of the sub projects to identify, assess and mitigate the environmental and social impacts of sub project investments. The ESMF also determines the institutional measures to be taken during the program implementation, including those relating to capacity building.

1.2 Rationale for the ESMF

An ESMF provides a general impact identification framework to assist project implementers to screen the projects and institute measures to address adverse environmental and social impacts. Specific information on country-wide project locations, land requirements, bio- physical features etc. when known at a later stage will trigger the preparation of Environmental and Social Impact Assessment. The proposed location for sub projects to be implemented under the SREP-funded Renewable Energy Fund (REF) are currently unknown. The Renewable Energy Fund Project (REFP) is expected to increase off-grid energy access in Rwanda through effectively addressing consumer affordability and access to finance challenges, thus facilitating achievement of GoR's off-grid access targets.

1.3 Program Description

1.3.1 Country and sector context

Rwanda has one of the fastest growing economies in Africa, with GDP growth averaging 7.6 percent in the period 2000-2015. Rwanda is a small landlocked country in East Africa, bordered by the Democratic Republic of Congo, Tanzania, Uganda, and Burundi. Rwanda's population is 11.6 million, of which 52 percent are women. It also has one of the highest population densities in Africa at an estimated 460 people per km^2. Rwanda has maintained political stability since the genocide and civil war in the early 1990s. Agriculture, mostly subsistence farming, dominates Rwanda's economy in terms of employment: it employs around 70 percent of the labor force and contributes over 30 percent of GDP.

Sustained high economic growth drove substantial reductions in both poverty and inequality. Poverty decreased from 59 percent in 2001 to 45 percent in 2011, while extreme poverty fell from 40 percent to 24 percent in the same period. The 2012 survey showed a further reduction in poverty to 39 percent and in extreme poverty to 16 percent, although due to methodological changes these numbers are not directly comparable with the previous surveys.[7] Sustained growth in household agricultural production has been a

[7] Economic Development and Poverty Reduction Strategy 2013-2018 (EDPRS-2); Fourth Integrated Household Living Conditions Survey (EICV4) available http://www.statistics.gov.rw/publications/rwanda-poverty-profile-report-results-eicv-4

key driver of poverty reduction. Despite these achievements, Rwanda remains one of the poorest countries in the world, with high levels of vulnerability, notably among children and people living in rural areas. More than 90 percent of the poor live in rural areas, while poverty remains high among households with many children.[8]

Rwanda's long-term development vision is captured in the Country's Vision 2020 program that seeks to transform the country from a low-income, agriculture-based economy to a knowledge-based and service-oriented, middle-income economy. Vision 2020 adopted in 2000 and revised in 2011 provides the overall framework with a main objective to place Rwanda on a higher growth trajectory to ensure that the country achieves middle-income status by 2020. Five-year Economic Development and Poverty Reduction Strategies (EDPRS) operationalize this development vision. The second EDPRS covering 2013-2018 is shaping policies and aims to achieve a double-digit annual average economic growth and reduce poverty to less than 30 percent. The strategy entrusts a primary role for the private sector during this period, serving as the engine of economic growth and poverty reduction.

In-spite of a recent slow-down in economic growth Rwanda's economic outlook for the medium-term remains strong. As a result of deterioration of the external environment and lower prices for Rwandan exports, growth slowed in 2016. To mitigate the impact of the growth slow-down Rwanda is implementing a fiscal consolidation program supported by greater exchange rate flexibility. The program is complemented with structural policies to promote sustainable growth with a special focus on export diversification and import substitution.

Rwanda identifies energy as an essential condition for sustainable growth and development. The Government of Rwanda (GoR) recognizes the importance of providing "appropriate, reliable, and affordable energy supplies for all Rwandans" if the country is to achieve middle-income status by 2020. In view of this, half of the thematic areas identified to achieve the goals of the second EDPRS – economic transformation and rural development – are intended to address the primary constraints to scaling up investment flows, including access, reliability and cost of energy.

1.4 Sectoral and Institutional Context

While there has been significant progress in recent years, the Rwandan electricity sector faces several challenges. Low access to electricity and high electricity cost, exacerbated by limited generation capacity, low efficiency of electricity supply, low household demand, and affordability constraints are primary obstacles to attracting and further scaling up investment flows. Consumer affordability and access to finance are particularly hindering the expansion of off-grid electricity services.

[8] Economic Development and Poverty Reduction Strategy 2013-2018 (EDPRS-2); Fourth Integrated Household Living Conditions; Survey (EICV4); Demographic and Health Survey (DHS) of 2015 using the stunting rate as the rate of malnutrition.

The total share of population with access to electricity has risen from about six percent (about 110,000 households) in early 2009, to 24 percent[9] (about 600,000 households) by mid-2016. This is an incredible achievement. However, the electrification rate reflects primarily grid-connected users in urban areas and remains largely concentrated in the top quintile, with almost negligible coverage in the bottom 40 percent of the population. For example, grid access within the districts of Kigali extends to 65-75 percent, whereas the districts outside Kigali are characterized by lower access rates, with 10 districts (out of 30) having connectivity rates of 6-15 percent. Off-grid access to electricity remains low throughout the country. According to the 2012 census, 0.48 percent of households had access to off-grid solar services and 0.17 percent to "hydroelectric or other private sources." In 2016, off-grid access is estimated at 2.6 percent.[10]

Rwanda is particularly affected by high electricity costs. Cost of service delivery in 2016 was about US$0.30 per kWh, much higher than the sub-Saharan Africa average, while electricity tariffs, US$0.21 per kWh on average, are not cost reflective and high compared to other countries in the region. Additionally, the average grid connection is heavily subsidized: out of the close to US$560 connection cost per household, consumers pay an approximately a US$75 connection fee over a two-year period.

Limited generation capacity and low efficiency of power supply are among factors that drive electricity costs up. The country's installed capacity in mid-2016 was 204 MW (with available capacity of 180 MW and peak demand of about 160 MW), of which 42 percent is hydro and 47 percent is thermal power generation. Most thermal generation is based on imported oil products transported to the country by truck, with about half of it produced using expensive diesel. While hydropower supply is strongly affected by variations in hydrology, lack of adequate grid interconnection capacity leaves Rwanda with limited possibility of sourcing electricity from its neighbors, creating a very fragile condition in terms of security of energy supply. The Rwandan electricity sector also has high system losses of 22-23 percent, of which 14-15 percent are technical losses (arising from prevalence of old and dilapidated networks as well as network design weaknesses) and 8-9 percent commercial losses (caused by pilferage, defective meters, errors in meter reading, accounting and billing deficiencies, unmetered supplies, and unpaid bills).

Low household affordability and, hence, low demand for electricity further hamper Rwanda's energy sector growth. About 46 present of Rwandan households are considered poor[11] their energy spend is quite low. Yet, households are dominant

[9] Current electricity access calculations assume there are approximately 2.4 million households in the country. This figure can be traced to the most recent census from 2012 and, in fact, reflects the actual number of households in that year. The National Institute of Statistics Rwanda, however, projects that there are over 2.8 million households as of 2016, thus suggesting a grid electrification rate closer to 21 percent.

[10] Estimated Tier 1 access per Multi-tier Framework as suggested by recent evidence from solar companies' sales.

[11] In Rwanda, all households are categorized into 'Ubudehe' categories. There are four Ubudehe categories, with Ubudehe 1 (16% of Rwandan households) being the poorest/most vulnerable and Ubudehe 2 (30% of households) – poor.

electricity consumers: they use 51 percent of all energy sold and use it primarily for lighting. As a result, almost half of the utility's consumers currently use less than 20kWh per month (against a minimum of 130 kWh per month to make the connection financially viable[12]); a large proportion of the population cannot afford their connection.

Rwanda's electricity sector has undergone several reforms since the 1990s aiming at achieving long-term sustainability, financial credibility, and increased private-sector engagement. The institutional structure of the electricity sector involves three key institutions: (a) the Ministry of Infrastructure (MININFRA), who sets the policy and strategy for the sector; (b) the Rwanda Utilities Regulatory Authority (RURA), who regulates the sector, approves electricity tariffs, etc.; and (c) the Rwanda Energy Group (REG) with its two subsidiaries – the Energy Development Corporation Limited (EDCL) and the Energy Utility Corporation Limited (EUCL), who are responsible for new energy development activities and electricity utility operations. The Rwanda Energy Policy (REP) sets out the overall vision and policy framework, whilst the Energy Sector Strategic Plan (ESSP) translates the policy directives and principles into concrete measures necessary to reach medium-term targets.

The GoR has an ambitious target to increase electricity access to 70 percent by mid-2018.[13,14] In its second EDPRS, approved in Mary 2013, GoR aims to put the country onto a higher growth trajectory in order to achieve middle-income status by 2020; 70 percent access to electricity by 2018 and 100 percent access by 2020 are essential EDPRS targets. These targets are to be achieved through a combination of on-grid and off-grid connectivity: the EDPRS expects 48 percent of the 2018 target to be achieved through grid extension, and the remaining 22 percent through off-grid solutions. Given available funding, grid access is expected to reach 32 percent (763,000 households) by 2018 and to 37 percent (870,000 households) by 2020. Moreover, the high cost of reaching rural households through the grid because of difficult terrain, together with low residential electricity demand and poor affordability, affects financial sustainability of grid-extension investments in rural areas.

In view of this, in May, 2016 the GoR approved a Rural Electrification Strategy that integrates on-grid and off-grid solutions and promotes private-sector investment in areas where extending the grid is not financially viable in the short term. The Rural Electrification Strategy (RES) re-frames the 2018 access target in terms of the tier level of access as defined by the SE4All Multi-Tier Framework (MTF)[15]: the 70 percent target

[12] Energy Sector Strategic Plan, 2015.
[13] Energy Sector Strategic Plan also targets that 100 percent of schools and hospitals will have access to electricity by 2018.
[14] Given the projected rate of population growth and decreases in average household size estimated by the National Institute of Statistics Rwanda, the number of households is expected to increase by over 100,000 annually over the short to medium term. This, in effect, makes the 70 percent electrification goal a 'moving target'.
[15] The Sustainable Energy for All (SE4All) initiative launched by the Secretary General of the United Nations in 2011 aims to achieve universal access to modern energy services by 2030. The MTF was developed to monitor and evaluate energy access under SE4All by following a multidimensional approach.

was defined to include 31-35 percent on-grid access; 13-17 percent off-grid access through systems providing at least Tier 2 access level; and remaining 22 percent off-grid access through systems providing at least Tier 1 access level. In order to effectively monitor implementation of the RES, Rwanda is among the first countries to conduct the energy access baseline survey using the new methodology under the MTF. The MTF baseline survey results are expected to be available in spring 2017.

The RES outlines four programs that will boost rural electrification in Rwanda by 2018. Under Program 1, the GoR plans to establish a mechanism to allow low-income households to access modern energy services through a basic solar system. Under Program 2, the GoR will establish a risk-mitigation facility targeting the private sector such that solar products will be made available on financial terms that the population can afford. Program 3 would facilitate development of mini-grids by the private sector, with the GoR playing a key role in identifying sites and establishing a framework through which these can become financially viable investments. Under Program 4, the GoR will continue to roll out the electricity network via its Electricity Access Rollout Program (EARP), focusing on connecting high consumption users and driving economic growth. The RES expects through its programs to channel approximately US$120 million of investment by 2018.

Achieving RES targets will require an aggressive expansion of the off-grid market. The RES expects to connect 35-38 percent, or almost one million households[16] using off-grid systems of different tier-levels of energy access by mid-2018. Over the last five years, the off-grid industry has grown substantially in Rwanda, though the market remains at early-stages underlined by the limited market penetration of off-grid systems. Over 200,000 Rwandan households have access to solar products, mostly through small solar systems such as solar lanterns. At this time, the off-grid market offers solar products and systems ranging from solar task lamps and solar lanterns (up to Tier 1), to larger solar home systems (Tier 1 and above), and is preparing for considerable expansion. The solar mini-grid space is made up of about 20 solar PV micro-grids, with each system of one kW solar PV with batteries serving clusters of up to 50 households per micro-grid. There are plans to scale up the number of PV pico-grids up to 70 grids, serving 2,000 households by the end of 2016. Moreover, the Hydropower Atlas, completed in 2007, identified 333 sites with capacities between 50 kW and five MW and 192 sites with capacities below 50 kW. There is a variety of productive loads in Rwanda, many of which are more than 5-10 kilometers from the grid, which could be the basis for an anchor load for a mini-grid scheme. Although there is a plan to eventually connect these

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The MTF approach goes beyond binary measurement of energy access as "having or not having an electricity connection" or "relying or not relying on solid fuels for cooking". It takes into account a multidimensional view of the energy sector by considering various service levels and attributes such as availability, quality, reliability, health/safety, convenience, and affordability, and it addresses multiple technology options (e.g., grid and off-grid electricity). MTF measures access in the tiered-spectrum, from Tier 0 (no access) to Tier 5 (the highest level of access).

[16] As per RES, 550,000 households (22 percent) are to be connected with at least Tier 1 off-grid systems; 325,000 to 425,000 households (13-17 percent) to at least Tier 2 off-grid systems.

to the central grid, the rate of grid roll-out is dependent on available financing, and the timing of these connections is therefore uncertain.

Over 20 off-grid solar companies are active in the Rwandan off-grid market. A few off-grid solar companies have been operating for more than three years. In the first half of 2016, over 100,000 Quality Verified17 solar products were sold in Rwanda, representing a 53 percent increase over the previous reporting period, and 5.8 percent of all Quality Verified products sold in Africa.18,19 Over 13 percent of these products were solar systems offering at least Tier 1 level of energy access. By the end of 2016, it is expected that there would be about 30,000 systems deployed in Rwanda providing at least Tier 1 access to households. In response to RES targets, several companies are interested in scaling up their operations in Rwanda, particularly to sell multi-light point solar home systems. Over US$100 million of financing would be required to deliver a multi-light point solar home system to the Tier 1-targeted 550,000 households, and over US$200 million to all off-grid-targeted households combining Tier 1 and higher levels of energy access. The operational challenge of delivering and maintaining this number of systems is also considerable.

Few developers are providing mini-grid electricity services despite the existence of an encouraging legal and regulatory framework for mini-grids. Issued by the Rwanda Utilities Regulatory Authority (RURA) in 2015, the Simplified Licensing Framework for Rural Electrification, introduced in 2015, applies to small isolated grids (below 50 kW), medium-sized isolated grids (50 kW-1 MW), and small power distribution networks of at least one MW. The framework streamlines the licensing and permitting process, presents options to mini-grid companies when the national grid arrives, and lays out the principles for setting cost-reflective tariffs. As the mini-grid sector is nascent in Rwanda, developers have expressed concerns about the workability of the framework, especially in regards to setting cost-reflective tariffs and negotiating the interconnection to the national grid with the utility. In addition, compatibility of the Simplified Licensing Framework with the new Public-Private Partnership (PPP) Law, approved in June 2016, is unclear. Furthermore, the lack of adequate commercial financing for mini-grid development has forced developers to depend on their own equity, angel investors, and mostly donor grants to finance these mini-grids and improve the affordability of electricity connections and consumption by mini-grid customers.

Increasing off-grid energy access will require addressing issues of affordability and access to finance in Rwanda. In terms of consumer affordability, local Savings and Credit Cooperatives (SACCOs) and commercial banks have yet to play any meaningful

[17] The product meets the World Bank Lighting Global Quality Standards (using IEC Technical Specification 62257-9-5). These quality standards have been widely adopted as the third party verifiable measure of quality for off-grid lighting products and SHS kits across the world.
[18] Of 101,726 overall Quality Verified product sales, multi-light point solar systems sold over 13,600 units (including pay-as-you-go); and single solar lamps sold just over 88,000 units. Sales are registered when products are shipped into an end market and are therefore not necessarily reflective of actual sales to end-consumers for a given time period.
[19] https://www.gogla.org/sites/www.gogla.org/files/documenten/global_off-grid_solar_market_report_jan june_2016_public.pdf

role in the off-grid sector. Rwandan SACCOs have virtually no experience in issuing loans for solar products and have therefore been unable to address affordability challenges faced by their members for these types of energy services. Rwandan banks, as the vast majority of commercial banks in sub-Saharan Africa, have stringent requirement for large amounts of additional collateral, which limits their servicing to wealthier and/or larger, well-established clients. Several off-grid solar companies have tailored their business models to address affordability of customers through pay-as-you-go business models, extending credit to their customers in order to allow them to pay for the systems in more affordable monthly instalments (instead of a lump-sum purchase). Mini-grid developers have been relying primarily on donor funding to make electricity services affordable to customers who are, in general, poorer than those in grid-served areas.

Donors have been providing some support to the development of the Rwandan off-grid market. GIZ remains one of the most active supporters via its Energizing Development (EnDev) program, which is providing results-based financing to solar companies (€3.4 million) and viability-gap financing to mini-grid developers (€1.8 million), targeting over 100,000 household connections. The EU has provided a grant (€6 million) to solar company Mobisol to deliver off-grid solar services to 49,000 households. Off Grid Elelectric has raised $7.5MM of debt for Rwandan expansion. Additionally, donor countries have funded various smaller, standalone solar system support programs targeting modest numbers of household connections, typically through grants or direct program funding. So far, existing donor support has not been enough to catalyze off-grid market growth to the extent envisioned by the GoR.

In November, 2016, the Scaling Up Renewable Energy Program (SREP)[20] approved the Rwanda Investment Plan (IP), developed and presented by GoR, with an allocation of US$50 million. The objective of Rwanda's SREP IP is to accelerate growth of off-grid electricity access through standalone solar systems and renewable energy-based mini-grids. The IP aims to catalyze private investments in provision of off-grid electricity services through the establishment of a Renewable Energy Fund (REF), particularly targeting stand-alone solar systems and mini-grids. The World Bank is the leading institution in managing SREP funds in Rwanda.

The World Bank has been a major strategic partner in Rwanda's electricity sector development and actively supporting development, implementation, and monitoring of the RES. The Bank assisted the GoR during preparation of the Rwanda SREP IP and, subsequently, the RES. The Bank has also been a leading donor of EARP, the anchor of RES's Program 4, which facilitates further grid extension, through the International Development Association (IDA)-financed Rwanda Electricity Access Scale-up and Sector Wide Approach Development Project (P111567), which has improved access to reliable and cost-effective electricity services to over 160,000 households and 220 public institutions; and the IDA-financed Rwanda Electricity Sector Strengthening Project (P150634), which will provide electricity access to additional 72,000 households. The Bank has been also advising the GoR on the design and implementation of RES's

[20] SREP is a multi-donor trust fund under the framework of the Climate Investment Funds.

Program 1, which aims to facilitate electricity access for low-income households. An Energy Sector Management Assistance Program (ESMAP)-World Bank team is supporting the MTF baseline survey in Rwanda that would allow effective monitoring of RES implementation.

The proposed SREP-funded Renewable Energy Fund (REF) Project will directly support the implementation of RES's Program 2 (risk-mitigation facility to incentivize private sector participation in off-grid solar space) and Program 3 (development of mini-grids by private sector). The REF is expected to increase off-grid energy access in Rwanda through effectively addressing consumer affordability and access to finance challenges, thus facilitating achievement of GoR's off-grid access targets. GoR envisions the proposed project as a pilot that could be scaled up into a primary mechanism for directing funds and technical assistance to the off-grid electricity sector, eventually attracting additional financing for rural electrification from other development partners and the private sector.

1.5 Project Objectives

1.5.1 Higher Level

The project is fully aligned with Rwanda's national and energy sector priorities. Increased access, reliability, and cost of energy services are among the GoR's main objectives under the country's Vision 2020 and the second EDPRS, which supports implementation of the Vision 2020. ESDPRS identifies rural development as a key thematic area and sets a target of increasing electricity access to 70 percent by mid-2018 through a combination of on-grid and off-grid solutions. Furthermore, the project will support implementation of the RES, which recognizes a prominent role for off-grid technologies in achieving the 70 percent access target.

The project is aligned with the World Bank Group FY2014-2018 Country Partnership Strategy (CPS) for Rwanda and the Bank's twin goals of reducing poverty and boosting shared prosperity. Increased energy access in Rwanda through greater private-sector participation will foster economic growth and directly support the CPS's objective identified under the first theme, which calls for "accelerating economic growth that is private-sector driven" and places energy investments as high priority to tackle high costs and low reliability of energy. The provision of electricity through mini-grids and larger solar systems for productive uses will contribute to the objective of the second theme, which is "improving the productivity and incomes of the poor through rural development and social protection." The proposed project will provide electricity access to the rural households who are predominantly poor, thereby enhancing their ability to participate and contribute to the economic development of Rwanda. Moreover, the project is also aligned with the World Bank Group's (WBG) Energy Directions Paper[21], which is designed to help client countries secure affordable, reliable, and sustainable energy supply needed to meet the Bank's twin goals.

[21] *Toward a Sustainable Energy Future for All: Directions for the World Bank Group's Energy Sector,* The World Bank Group, July 2013.

Furthermore, the project is consistent with the higher-level objectives of SREP. The project will support development of off-grid energy markets in Rwanda and assist in establishing conditions necessary for off-grid markets to make their full contribution over the long-term to a low-carbon development pathway, reductions in energy poverty, increasing energy security, and increasing access to renewable energy.

1.5.2 Project Development Objectives

The Project Development Objective (PDO) is to increase electricity access in Rwanda through off-grid technologies and facilitate private-sector participation in renewable off-grid electrification.

The achievement of the PDO will be measured using the following indicators:

1. People provided with new or improved electricity service (number) (Corporate Results Indicator);
2. Enterprises provided with access to electricity (number);
3. Increased private sector investment in renewable energy electrification (US$); and
4. Annual electricity output from renewable energy (MWh per year) (SREP).

1.6 Project Beneficiaries

The final project beneficiaries are Rwandan households and businesses which will gain access to off-grid electricity services through solar systems or mini-grids and whose use of electricity will replace consumption of diesel, kerosene, and dry cell batteries as well as other alternative fuels. The direct project beneficiaries include (i) participating SACCOs and commercial banks, which will gain knowledge and experience in lending in a new sector; (ii) mini-grid developers who will gain access to finance to build mini-grids; and (iii) private companies engaged in off-grid electrification (mini-grid developers and potentially locally-registered off-grid solar companies), which will get access to financing for expanding their businesses in Rwanda as well as gain experience of working with local financial institutions. The Development Bank of Rwanda (BRD) will also benefit from capacity building in energy lending.

The project will facilitate the deployment of about 350,000 off-grid connections and benefit over 1,000,000 people, 52 percent of whom are women.

1.7 Project Components

Component 1: Line of credit and direct financing for off-grid electrification

This component will set up and operationalize a REFP, a local-currency line of credit and direct financing facility that will help address access to finance and affordability constraints in Rwanda in order to accelerate growth of the off-grid electrification market. The REFP will provide lines of credit to local financial institutions for sub-loans to households and micro, small and medium enterprises, as well as direct loans to private companies engaged in off-grid electrification (mini-grid developers and potentially locally-registered off-grid solar companies). The REF will use existing country systems

to facilitate access to finance for households and businesses, improve affordability of solar electricity services, and maximize geographic coverage.

The REFP will provide access to local-currency financing through the four financing windows described below. This will allow the facilitation of off-grid market development through mobilization of all the key market enablers at the same time: SACCOs, banks (commercial and microfinance), and private companies (mini-grid developers and potentially locally-registered off-grid solar companies).

Window 1 – On-lending through SACCOs to households and micro-enterprises: The window will provide a wholesale line of credit to BRD for on-lending to SACCOs that comply with established eligibility criteria. SACCOs will on-lend the funds to eligible households and micro enterprises for purchasing of at least Tier 1 solar systems.

Window 2 – On-lending through banks (commercial and microfinance) to households and small and medium enterprises (SMEs): The window will provide a wholesale line of credit to BRD for on-lending to eligible commercial and microfinance banks, which will the extend sub-loans to households and SMEs for the purchase (and possibly, in the case of SMEs, distribution) of solar systems of at least Tier 1 access level.

Window 3 – Direct financing of mini-grid developers: This window will provide direct financing to eligible mini-grid developers to finance construction of renewable-energy based mini-grid systems. This window could be used as a "bridge loan" to facilitate implementation of existing results-based financing (RBF) programs in Rwanda (e.g., EnDev) that provide subsidies on capital expenditure for mini-grids offering Tier 2 and above service levels upon validation of connections at commissioning of mini-grids. In this case, REF loans would be used to bring a mini-grid project to commissioning, when RBF becomes available from other donor-funded programs. Selection of projects will adopt a technology neutral approach. Hybrid systems, including diesel back-up, will be eligible for support under the condition that the diesel component is financed from sources other than SREP.

Window 4 – Direct financing of locally-registered off-grid solar companies supporting Tier 1 or higher solar systems: This window will provide direct financing to eligible locally-registered off-grid solar companies offering at least Tier 1 solar-home systems and ongoing maintenance services to its clients through delayed payment options. Eligible companies will have to leverage REF financing 2:1.

Implementation of Component 1 will commence with Windows 1, 2, and 3 (SACCOs, banks, and mini-grid developers), whereas the activation of the Window 4 (locally-registered off-grid solar companies) will be postponed until year two of project implementation. Window 4 will be considered for activation after a detailed assessment of active REF windows' performance is conducted. The detailed performance assessment would look at, among others, the following indicators: (i) total number of off-grid systems supported by the project to date; (ii) number of off-grid systems supported by each window to date; (iii) number of SACCOs, banks, and mini-grid developers

participating in the project; (iv) amount of project funds disbursed through each window; (vi) amount of funds on-lent by SACCOs and the banks; (vii) performance of project-related loan portfolios of SACCOs and banks. The Project Operations Manual (OM) will describe the process for activation of Window 4 in detail.

Access to financing for all four windows will be on a first-come-first-served basis to allow for flexibility during project implementation. All SACCOs, banks, mini-grid developers, and locally-registered off-grid solar companies interested to receive REF financing will be required to comply with eligibility criteria agreed with the Bank. For Windows 1 and 2, participating SACCOs and banks will be required to enter into service agreements with solar companies to ensure that solar systems supported by these windows are appropriately serviced during sub-loans' tenor; participating SACCOs and banks will extend sub-loans to households and enterprises for solar systems purchases only from companies with whom they have active service agreements. All supported systems will be required to meet the Lighting Global Quality Standards. The Project OM will describe the eligibility criteria and on-lending process for each window.

Component 2: Technical assistance, capacity building and project implementation support

This component will provide necessary technical assistance and capacity building to BRD and participating entities (SACCOs, banks, and private companies engaged in off-grid electrification) as well as provide project implementation support to BRD as host of the facility. Technical assistance and capacity building will include, among others: (i) capacity building and awareness workshops for SACCOs, banks, and private companies engaged in off-grid electrification to facilitate partnerships between SACCOs, banks, and the private sector; (ii) technical assistance and capacity building for participating SACCOs and banks to ensure their successful partnerships with the private sector; (iii) capacity building of participating SACCOs and banks to manage energy credit lines (including management, operational, and monitoring and evaluation capacities); (iv) capacity building of the Energy Division of BRD to manage direct energy lending; (v) technical assistance to BRD to develop pipeline of mini-grids projects; and (vi) technical assistance and capacity building for BRD and participating entities on quality assurance and enforcement of technical standards for off-grid solar systems, etc.

Project implementation support will include, among others: (i) establishment of the Project Implementation Unit (PIU) and provision of operational support to the PIU in the areas of project management, supervision, and monitoring; (ii) outreach to key off-grid market enablers-potential direct project beneficiaries; (iii) knowledge-sharing events between participating project entities; (iv) sector-wide knowledge-sharing and project results dissemination workshops; (v) preparation of required studies related to the project, including impact assessment; (vi) preparation of consolidated annual project audits; and (vii) financing of incremental operating costs, etc. Cooperation and co-financing opportunities with other donors, e.g., Belgian Technical Cooperation (BTC), GIZ, Swedish International Development Agency (SIDA), will be explored.

Project Financing

The US$48.94 million project will be financed by the SREP Trust Fund. The SREP funding is comprised of a US$21.4 million grant; and a US$27.5 million loan extended with a service charge of 0.1 percent per annum on the disbursed and outstanding loan balance and 40-year maturity, including a 10-year grace period, with principal repayments at two percent for years 11-20 and four percent for years 21-40. Principal and service charge payments accrue semi-annually. The funds will be transferred (grant portion)/ on-lent (loan portion) by the GoR to the BRD.

Table 2. Project Financial Component

Project Components	Project cost	IBRD or IDA Financing	Trust Funds	Counterpart Funding
Component 1: Line of credit and direct financing for off-grid electrification	45.0	-	45.0	
Component 2: Technical assistance, capacity building and project implementation support	3.94	-	3.94	
Total Costs	48.94		48.94	
Total Project Costs				
Total Financing Required				

1.8 Project Institutional and Implementation Arrangements

BRD will be the project implementing agency and will manage the project through a Project Implementation Unit (PIU) that will be established and located at BRD's office. For Component 1, BRD will function as a wholesale institution for Windows 1 and 2, as well as lend directly to mini-grid developers under Window 3 and locally-registered off-grid solar companies under Window 4, if it is activated. BRD was assessed against the criteria put forward in World Bank Operational Policy (OP) 10.00[22] and qualifies to be an intermediary for the credit line as well as a direct lending institution. The OP10.00 assessments is summarized in **Annex 5**. BRD will also be in charge of implementation of Component 2.

[22] OP10.00 requires an assurance that all financial intermediaries in a World Bank financed credit line are viable financial institutions determined by: (a) adequate profitability, capital, and portfolio quality as confirmed by audited financial statements; (b) acceptable level of loan collections; (c) appropriate capacity, including staffing, for carrying out subproject appraisal (including environmental assessment) and for supervising subproject implementation; (d) capacity to mobilize domestic resources; (e) adequate managerial autonomy and commercially oriented governance; and (f) appropriate prudential policies, administrative structure, and business procedures.

BRD will host the PIU and will be responsible for monitoring indicators, supervising the credit lines and direct loans, and implementation of the necessary technical assistance to the beneficiaries. This includes collecting necessary information from project beneficiaries, assessing and monitoring SACCOs' and banks' compliance with the respective eligibility criteria, supervision of withdrawal applications and loan books, and reporting on progress during implementation. BRD will also review annual audited financial statements of the intermediaries and conduct periodic on-site supervision to assess compliance and progress. SACCOs and banks will report to BRD on their sub-loan portfolio on a semi-annual basis.

To do so, the PIU will have personnel with experience in off-grid energy, project management, procurement, accounting, and environmental and social management. Additionally, the PIU will undertake technical due diligence of proposals for mini-grid financing and, if necessary, direct lending to off-grid solar companies with support from specialized technical consultants, institutions with experience in the off-grid energy sector (e.g., EDCL), and donor programs (e.g., EnDev). BRD will receive capacity building and technical assistance to enhance its performance and project implementation capacity.

Thirty better-performing SACCOs in less electrified districts have been identified for initial project participation; eight banks expressed interest to participate in the project. Ten out of 30 SACCOs have been assessed against the established eligibility criteria; all of them generally meet the criteria, though significant capacity building will be required to enhance their performance and ensure successful project implementation. Ten additional SACCOs will be appraised before the project delivery to the Board and the remaining ten will be appraised after project implementation commences. More SACCOs are expected to join the project once it takes off. Moreover, SACCOs are currently going through a consolidation process and will be merged into thirty district SACCOs; once the process is completed, most the new district SACCOs are expected to participate in the project, though they will first have to be appraised based on the eligibility criteria. Two banks have been assessed against the OP10.00 criteria and one was found eligible to participate in the project. At least two additional banks will be assessed during project appraisal.

For the wholesale windows, SACCOs and banks will enter into service agreements with off-grid solar companies to coordinate their energy lending, disbursement and customer service processes. The solar companies will need to provide product warranty and servicing for the whole duration of loan tenors extended by SACCOs and banks. The project OM will provide a template of the agreement.

A Steering Committee will be established for effective coordination and project oversight. The Ministry of Infrastructure (MININFRA), Ministry of Finance and Economic Planning (MINECOFIN), BRD, and the World Bank will be members of the Steering Committee for the project; other key energy sector stakeholders could be invited to steering committee meetings, if necessary. The Steering Committee will meet at least

every six months, or as needed during project implementation to review implementation progress, discuss emerging challenges, and identify mitigating measures. Key basic functions of the Steering Committee will include: (i) monitor project implementation progress; (ii) identify and address challenges with participating entities; and (iii) approve changes to the project OM. The terms of reference of the Steering Committee, including responsibilities and composition, will be stipulated in the OM. The first meeting of the Steering Committee is expected in June 2017, soon after project approval.

2 METHODOLOGY AND CONSULTATION

2.1 Detailed & In-depth Literature Review

Review on the existing baseline information and literature material was undertaken and helped in gaining a further and deeper understanding of the proposed project. A desk review of Rwanda's legal framework and policies was also conducted in order to the relevant legislations and policy documents that should be considered during project implementation. Among the documents that were reviewed in order to familiarise and further understand the project included:

World Bank Related Documents

- World Bank Safeguards Policies
- Project Appraisal document
- BRD's SEMS document

Rwanda's Legislative Documents

- Constitution of Rwanda
- Organic Law
- Labor Code
- Expropriation law

2.2 Stakeholder Consultations

Consultation of stakeholders was undertaken on the 10th February 2017 at the Portofino Hotel in Kigali, where a total of 48 participants attended the consultation workshop on the ESMF. Participants for the consultation workshop included:

1. Sacco Representative
2. Renewable energy power investors
3. Ministry of Infrastructures
4. Rwanda Environment Management Authority
5. Energy regulatory institutions
6. Energy generation companies
7. Energy transmission companies
8. Energy utility companies
9. BRD

The workshop generated significant issues from the participants which were incorporated in the ESMF. The issues raised and concerns expressed including possible mechanisms of addressing these issues and concerns are highlighted in the stakeholder consultation section of this report (chapter 9) and appended as **Annex B** of this document.

2.3 Preparation of ESMF

Preparation of the ESMF included the following stages:

- Collation of baseline data on the environmental conditions of the country in general;
- Identification of positive and negative environmental and social impacts of sub projects investments;
- Identification of environmental and social mitigation measures;
- Preparation of screening procedures to be for sub project proposals;

3 BASELINE DATA

3.1 Location and Size

Rwanda is a small mountainous landlocked country, located in Central Africa, at latitude 2 00 S and longitude 30 00 E, bordered to its South by Burundi, Tanzania to its East, Uganda to its North and the Democratic Republic of Congo (DRC) to its West. Rwanda has a total surface area of 26; 338 sq. km of which the total land area is 24, 948 sq. km and 1, 390 sq. km is surface water.

3.2 Physical Environment

3.2.1 Climate

Rwanda enjoys a tropical temperate climate due to its high altitude. The average annual temperature ranges between 16°C and 20°C, without significant variations. Rainfall is abundant although it has some irregularities. Winds are generally around 1-3 m/s.

In the high regions of the Congo-Nile ridge, average temperatures ranges between 15 and 17°C and the rainfall is abundant. The volcanic region has much lower temperatures that can go below 0°C in some places. In areas with intermediary altitude, average temperatures vary between 19 and 21°C and the average rainfall is around 1000 mm /year. Rainfall is less irregular, and sometimes causes periods of drought. In the lowlands (East and Southeast), temperatures are higher and the extreme can go beyond 30°C in February and July-August. The absolute 9 temperature of 32.8°C was recorded in the Southeast by Karama-Plateau station on the 4th of September 1980.

Thermic constraints are more considerable there than in the remaining part of the country. Rainfall is less abundant in that region (700 to 970 mm/year). Weather in Rwandan is determined by the rainfall patterns. Thus, the climate of the country is characterized by an alternation of four seasons of which two are wet and the other two are dry. However, one can notice that rainfall is generally well distributed throughout the year, despite some irregularities. Eastern and South-Eastern regions (Umutara, Kibungo, Bugesera, Mayaga) are more affected by prolonged droughts while the northern and western regions (Musanze, Rubavu, Nyamagabe and Gicumbi) experience abundant rainfall that usually causes erosion, flooding, and landslides.

The quantity of total annual rainfall varies between 800mm in the North-East of Rwanda (Eastern Umutara) and 1600 mm in the natural forest of Nyungwe and in the high lands of the North-West (Kinigi). The decrease in rainfall is observed in the region of Bugesera (900 mm) and in the Western part of Rubavu district (1200 mm). The increase of rainfall is observed in some regions like Kibungo (Gahororo, 1200 mm); in the South-West (Mibirizi, 1450 mm) and in the natural forest of Gishwati (1350 mm).

The region that is characterized by the highest rainfalls (over the average isohyets of 1200 mm) is located in the western half of the country, from Byumba to Kibeho and from Kinigi to Mibirizi including the region bordering Lake Kivu.

3.3 Relief

The Rwandan relief is hilly and mountainous with an altitude varying between 900 m and 4507 m. The components of that relief are: Congo-Nil Ridge over laying Lake Kivu with an altitude between 2500 m and 3000 m. It is dominated in the North-West by the volcanic ranges consisting of five volcanic massifs of which the highest is Karisimbi with 4507 m. The central plateau presents a relief of hills with an altitude ranging between 1500 m and 2000 m. The lowlands of the East are dominated by a depression characterized by hills with more or less round top and 1000 to 1500 m in altitude. The lowlands of the South-West in Bugarama plain with an altitude of 900 m are part of the tectonic depression of the African Rift Valley.

3.4 Topography

Rwanda is often referred to as the country of a "thousand hills" (mille collines), because of its numerous highly dissected hills, often with flat peaks and convex slopes mainly in Northern and Western part, separated by relatively narrow valleys, with the lowest altitude of around 900 m at Bugarama and the highest altitude at Mount Karisimbi 4,519 m. The average altitude is 1,250 m above sea level.

Rwanda can be divided into six topographical regions which are:

- From North-West to South -West are the narrow Congo Nile Ridge, which slopes sharply to Lake Kivu
- The Volcanic Virunga Mountains, whose highest peak, Mount Karisimbi, towers over the high North-Western lava plains.
- The steep North-South rise of the Congo – Nile Basins divide, whose width averages 25 km.
- The ridge of the Congo – Nile Basins divide, with an average elevation of 2750 m above sea level.
- The central plateau East of the mountains, which are covered by rolling hills.
- The savannas and swamps of the Eastern and South Eastern border areas which cover one tenth of the nation's land area and include the Akagera National Park.
- Most of Rwanda is at least 900m above sea level; the central plains have an average elevation of 1932m, while South-Eastern Rwanda has a desert like terrain.

3.5 Catchment and Hydrology

Rwanda has a relatively big quantity of water: rivers, lakes and marshes and occupy a surface area of 211000 ha or about 8% of the national territory (lakes: 128000 ha, rivers: 7260 ha and marshes: 77000 ha).

3.5.1 Surface water

Rwanda has a dense hydrographical network of ± 2 km/km² (length of the superficial flow network by km² of surface). The country is divided into two hydrographical basins with a separating line called Congo-Nile Ridge, moving from the North to the South and ± perpendicular to the volcanic chain, making natural obstacles exchange between the

catchments basins of the Northern Kivu and the Southwest of Uganda and those of Rwanda.

In the West of that line there is the Congolese basin (33% of the surface of the national territory) that drains 10% of water resources of the country. It comprises rivers Sebeya, Koko, Rusizi, Rubyiro, as affluents of Lake Kivu (around 1000 Km2 on the Rwandan side, 490 m of maximum depth), Ruhwa and many other small rivers (around 127 rivers).

In the East of the Congo Nile Ridge there is the Nile basin which covers 67% of the National territory and drains 90% of Rwandan waters by two main rivers namely Nyabarongo and Akagera. The latter is the main affluent of Lake Victoria with an average outflow of 256 m3 /s at Rusumo station and thus considered as the source of the Nile. The basin of the Nile in Rwanda comprises a lot of small lakes (Burera, Ruhondo, Cyohoha South, Mugesera, Muhazi, Rwampanga, Mihindi, Mirayi and many others). Those lakes are not very deep (5 to 7 m of depth) except for Lake Burera and Ruhondo which are 65 to 173 m deep.

3.5.2 Groundwater

The outflow of the ground renewable water resource is estimated at 66 m^3/s. Out of this, the 22,000 known sources contribute an output of 9 m^3/s. In general, little information is available on ground water resources.

3.5.3 Lakes

Rwanda has some 28 lakes of significant size. Six among the largest are entirely within the national territory: Ruhondo, Muhazi, Mugesera, Ihema, Rwanyakizinga and Burera. Three others, Rweru, Cyohoha and Kivu, are shared with neighboring countries. The largest and most spectacular is Lake Kivu, so large as to seem almost like a sea to the landlocked inhabitants. Lake Kivu lies at 1, 460m above sea level and is 90 km long (north-south) and 49 km wide (east west). From an average depth of 240 m, it plunges to a maximum depth of 490 m.

Lake Kivu has a rough, jagged coast and contains numerous islands, including Nkombo and Iwawa. Lake Kivu lies on the border with Congo in Western Rwanda at the foot of the Virunga Volcanoes. Kivu's shores are densely populated and the principal town on the Rwandan side is Rubavu. Although it is supplied with fish, the lake is poor in fauna but rich in volcanic substance. Great volumes of dissolved methane gases (~60 km3 STP) that may be developed as energy sources exist in its deep waters. Lake Kivu drains to the south into Lake Tanganyika by the swiftly descending Ruzizi River.

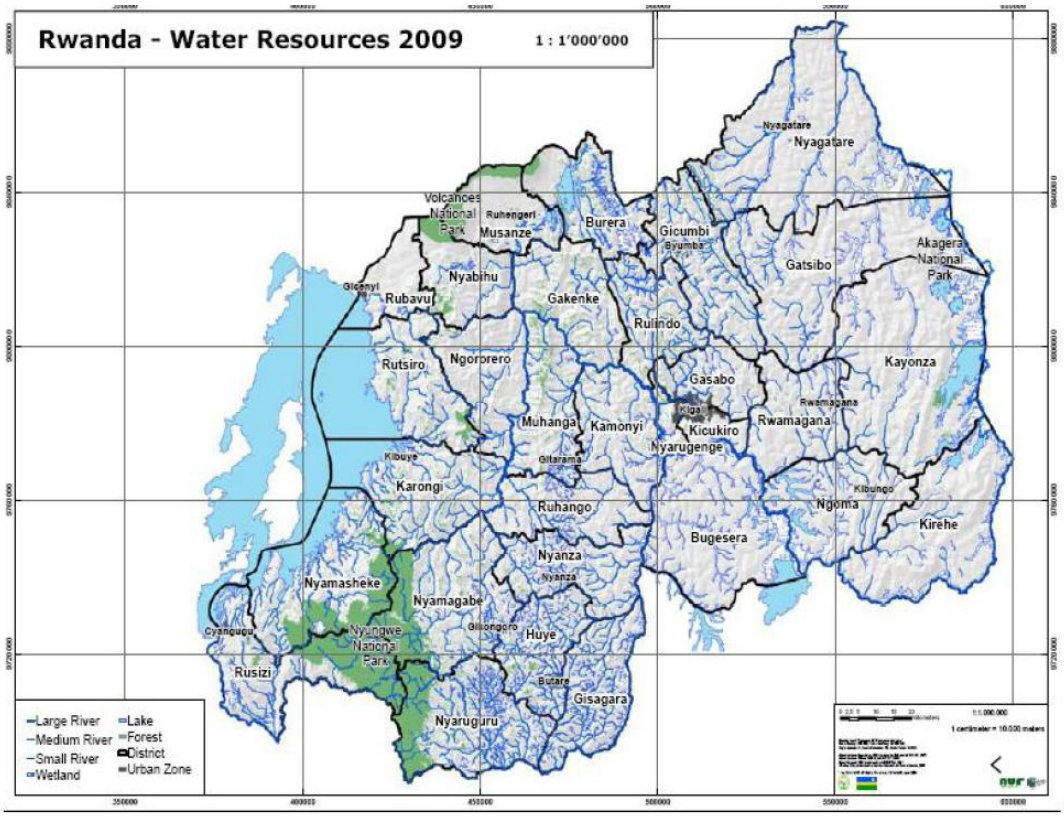


Figure 1: Water Resources in Rwanda

In Rwanda the quality of water is generally good with a pH ranging between 6 and 7.5. Surface water often carries sediments and in mining and volcanic regions, the water can contain arsenic, lead, mercury, fluoride, iodide and other toxic metalloids and heavy metals. The physio-chemical pollution of water is not frequent due to the small level of industrialization and use of agricultural chemical inputs. The microbiological pollution is often observed and it comes from various domestic wastes and debris carried by rain water towards the natural environment. The pollution of water courses and lakes by the water hyacinth and other harmful aquatic plants is a phenomenon that is very recent and alarming in Rwanda.

3.5.4 Wetlands

Wetlands cover a total area of 164,000 ha or about 6% of the territory. The wetlands include a variety of ecosystems, ranging from large, permanently flooded swampy peat-lands to smaller, seasonally flooded wetlands with a more mineral soil. The main swamps are Akanyaru (30,000 Ha) on the border with Burundi, Mugesera Rugwero in the southeast, Kagera swamps along the Tanzania border in the east, Nyabarongo (10,000 ha) and the Rugezi wetlands (5,000 ha) in the north.

The wetlands serve as troughs for sediment particles and play an important role in the national water balances by acting as a buffer, thus reducing the maximal flow rates during the rainy season and maintaining a relatively high flow rate during the dry season.

Currently, an estimated 94,000 ha have been brought under agriculture, the large majority of this being spontaneous agriculture with maize, sweet potatoes and beans. In addition, the wetlands are used for a variety of traditional activities including the collection of leaves to make handicrafts, extensive grazing and making of bricks. Wetlands also provide a spawning habitat for fish, and are of great significance for biodiversity conservation. The wetlands are composed of marshes, lakes, rivers and brooks representing around 14.9% of the national territory of which 6.3% consist of marshes and 8.6% of lakes, water courses and pools of permanent or seasonal fresh water.

In the highlands of the North-West, there are: lakes Burera and Ruhondo as well as the marshes of Rugezi. In the Central and the East of the country, wide marshes are those of Nyabarongo, Akanyaru and Akagera rivers. Many cuvette lakes connect with rivers and most of them are located in the Akagera National Park. From the Southeast to the North-West, there are lakes like Cyohoha in the South, Mugesera, Rweru, Sake, Cyambwe, Ihema, Milindi, Rwanyakizinga, Kivumba, etc.

Given the importance that the Government of Rwanda attaches to wetlands, in 2003 Rwanda ratified the Ramsar Convention or convention on wetlands and has already registered on the Ramsar list the site of Rugezi and identified other potential sites that will be registered in the future, like the complex of Mugesera-Rweru, Kamiranzuvu marshes and the wet zones of the Akagera National Park. In addition, an action plan for the implementation of the Ramsar Convention was developed in June 2004. The wetlands ensure several functions and provide numerous services to people. For instance, they ensure control of floods and the recharge of underground waters. They play the role of alleviating the erosive force of water and thus facilitate the deposit of sediments in suspension that could block water courses downstream.

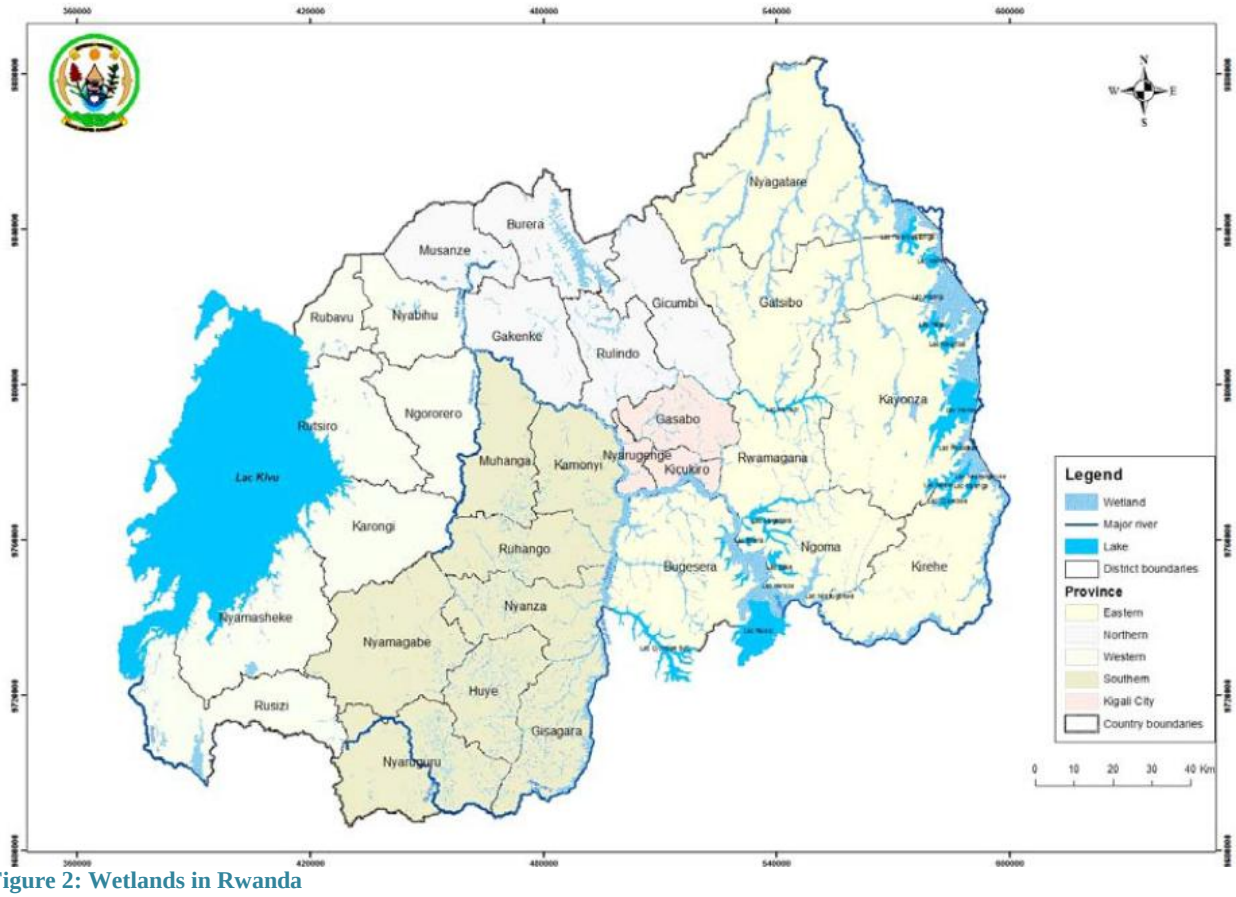


Figure 2: Wetlands in Rwanda

3.6 Soils and Geology

According to the Geological Map of Rwanda, the regional geology consists of pelitic rocks and QuartzPhyllites (Cyurugeyu Superformation), Granites to Granite-Gneisses, Quarzites and Mica-Schists, Amphibolites and Mylonites (Huye Complex) as well as Quartz-Phyllites and Meta-Volcanics (Nyungwe Formation). The greater part of the geological structure is occupied by such lithological varieties of Rocks. Rwanda shows well developed drainage pattern that belongs to dendritic and trellis types. Metamorphic rocks form the major part of the rock mass and some magmatic rocks are also present. Major rock types observed in the area are granitic gneiss, quartzite, schists and amphibolite.

The dominant soils are the result of alteration of the granite and the gneiss. Disruption of drainage due to tectonic movements of the Pleistocene caused the formation of alluvial valleys. They consist of alluvium and colluvium in the basin as result of the erosion. They have generally colluvial and alluvial in the valleys around the rivers. The soils of the top of the mountains are products of granite and gneiss and have resisted erosion.

Soils derived from schistose, sandstone and quartzite formations found in the Congo-Nile Ridge and Soils derived from old volcanic materials found in the plateau of the south west of the country.

3.6.1 Use of soils

The exploitation of land employs around 70% of the active population. Land resources are thus limited and coveted resulting in overexploitation and inappropriate use of lands with disastrous consequences on land resources and on environment in general.

In mountainous area, steep slope lands are deforested and used for staple crops under high rainfall precipitation, with often accelerated land degradation through water erosion, poorer soil fertility, increased floods and landslides, and overall, food insecurity and poverty. Appropriate land uses combined with soil and water conservation measures then become a must; in some sites, active erosion mainly caused landslide hazards which increase sediments in rivers. Other than that, erosion has also formed gully bodies through the slopes of mountainous area.

Land use activities including infrastructure development may increase the potential of occurrence of landslides and erosion in various ways, which include destabilization of rock masses by cuts in slopes, improper stockpiling of materials, destruction of vegetative cover during site clearing and uncontrolled surface run-off during storms may increase the erosion rate. River banks are composed of alluvial and pluvial loose-fragmental soils. Thus, the activities may increase erosion and landslides rates at various points along the banks of rivers and in some lateral ravines.

Intensive cultivation occurs along the steep slopes predominant in the area without proper soil conservation techniques hence accelerating soil erosion. However, it is worth mentioning that terracing as a measure for soil erosion control is practiced in some parts of the project area.

Extensive deforestation to meet energy demands has further reduced the soils 'ability to withstand the scouring effects of rain in the upland watersheds has had serious downstream implications. When viewed against that background, therefore, it is easy to appreciate that the project would have negligible incremental impact on the rates and overall patterns of erosion. Nevertheless, erosion is of relevance to slope stability, which is in turn relevant to the design of the project and the conduct of operations such as excavation and borrowing. The specific measures will be taken to address these considerations.

Highland soils

The highland soils are particularly prone to erosion and landslides especially regions of the Congo-Nile ridge, valleys and lowlands (peat lands) as well as highland meadows. Soils of foothills of the Congo-Nile Ridge and of other transition regions between the central plateau and highlands are fertile but, due to deforestation and inappropriate agricultural practices, they are vulnerable to erosion.

Soils of the central plateau
The central plateau covers the regions of South and South-East. The soil types are hill Ferro soils and valley histosoils. The slopes of hills are exposed to erosion notably in the case of clay-sandy or gravely soils.

Soils of the lowlands
They cover the Eastern and South-eastern regions and are Ferro soils with savannah vegetation. Similar to the region of Bugesera, the river-lake complex along Nyabarongo and Akanyaru rivers underwent serious leaching. In addition, the geological structure of soils in those regions allows rain waters to infiltrate deeply into soils, and that can partly explain the lack of runoff waters and shallow brooks.

Soils of valleys
These are soils of histosoil and peat soil types that constitute potential agricultural and energy wealth (case of intermountain basins of Kamiranzovu and Rugezi). In the wide water surfaces of eastern regions like Umutara and Bugesera, as well as the Rusizi region (Bugarama), the valleys are of vertisoil and alluvial types are fertile. The slope slight as they may be, are threatened by erosion due to the weak permeability of soils.

The exploitation of peat for fuel production purposes would require a preliminary development plan for swampy areas. In fact, any extraction of peat is associated with drainage and exudation, two factors likely to impact negatively on the crucial role of wet ecosystems and swamps in regulating the hydrology. Moreover, the exploitation of mines and quarries spoils the landscape and more often constitutes a source of soil erosion, water pollution and pose a danger to human health. A good number of queries are not rehabilitated and always left open.

3.7 Biological Environment-Ecosystems

Rwanda is covered with diverse ecosystems that include mountains, forests, and gallery forests, savannahs, wet and aquatic zones, wood and agro ecosystems. All these ecosystems have rich flora and fauna.

3.7.1 Forests

Rwanda's remaining natural forests, the Nyungwe Forest, the Gishwati Forest and the Mukara Forest, are highland forests around the volcanoes, have a high degree of biological diversity and rare animal species, such as mountain gorillas, Ruwenzori colobus monkeys and golden chimpanzees.

It is estimated that there are 2150 plant species to be found in Rwanda, with around 700 species of these acknowledged to have medicinal value. Towards the east of the country lies the Akagera National Park, the Mutara game reserve forests galleries and wooded savannahs. Population pressures have already drastically reduced the land area of the natural forests of Rwanda from about 30% to presently fewer than 10% in less than a century. The deforestation of Rwanda's remaining forests is also the result of high fuel wood consumption. Heavily populated and cultivated areas adjacent to the natural forest,

as well as the recent wars, have resulted in massive deforestation and loss of genetic diversity within Rwanda's natural forest.

Clearance for farming and pasture land has also contributed to the reduction in forest cover, as well as harvesting for fuel wood and timber for housing and small scale mining. Production of export crops is also a factor in forest destruction: half the forests around the volcanoes in the North were cleared for pyrethrum plantations in the 1960's, and areas around the Nyungwe were cleared for tea plantations.

Preliminary estimates indicate that the protected areas and forest reserves were seriously damaged as a result of recent wars. From an estimated pre-1994 total surface area of 417,000 ha, it is thought that they have been reduced to approximately 226,000 ha. Specifically, the Akagera National Park was reduced to less than one-third of its original size when the Umutara prefecture was created in 1996 for the resettlement of returning refugees. The Gishwati Forest has all but disappeared (from a pre-war estimate of 37,000 ha, only about 2,000 ha now remain.

3.7.2 Protected areas

The fauna and the flora can be better preserved and protected thanks to the establishment of a system made of protected areas like national parks and forest reserves to which the best management is applied. However, through time and due to human activities, these conservation areas have been reduced considerably. These areas are exclusively reserved for the protection of flora and fauna, eco-tourism, biodiversity conservation, and for geological formations of scientific and aesthetic value. The geographical distribution of those parks on the national territory is a guarantee of the conservation of biological diversity representative of the fauna and flora of the country.

Volcanoes National Park

Spanning on a 160 Km2 area in the Northern part of Rwanda, Volcanoes national park is the oldest national park in Africa, created in 1925. It was initially a small area around Karisimbi, Mikeno and Visoke volcanoes which was gazetted to protect the Mountain gorillas which were facing the threat of extinction as a result of poaching. In 1929, the park was extended into Rwanda and the then Belgian Congo and was named Albert national park managed and run by the Belgian Colonial Authorities. During early 1960s, the park was divided as Rwanda and Congo gained their independence and by the end of that decade, the park was almost half of its original size (340 Km2 to 160 Km2.

Volcanoes National Park is home to Mountain Gorilla (*Gorilla beringei beringei*); golden monkeys (*Cercopithecus mitis kandti*), Spotted Hyena (*Crocuta crocuta*), buffaloes (*Synceruscaffer*), elephants, black-fronted duiker (*Cephalophus niger*), and bushbuck (*Tragelaphusscriptus*). The park also harbors 178 bird species including at least 29 endemics to Rwenzori mountains and the Virungas. The VNP also host 245 species of plants of which 17 are Predominant, including 13 orchids internationally protected, 115 species of mammals, 27 species of reptiles and amphibians and 33 species of arthropods. Some of these species are endemic while others are internationally protected.

Nyungwe National Park

Located in the South West corner of Rwanda, Nyungwe National Park is an untouched natural rainforest that is filled with exciting biodiversity. Nyungwe National Park was established in 2004 and covers an area of approximately 1000 km² of rainforest, bamboo, grassland, swamps, and bogs. The nearest town is Rusizi, 54 km to the west. Mount Bigugu is located within the park borders. Nyungwe is surely one of the world's most beautiful and pristine mountain rainforests. It's believed to be one of Africa's oldest forests, staying green even through the Ice Age, which explains its diversity. The Nyungwe forest has a wide diversity of animal species, making it apriority for conservation in Africa. The forest is situated in a region in which several large-scale biogeographical zones meet and the variety of terrestrial biomes provides a great span of microhabitats for many different species of plants and animals.

The park contains 13 different primate species (25% of Africa's total) with habituated chimpanzees and 12 other primates species (including a 400-strong troop of habituated Ruwenzori Black and White Colobus), 85 mammal species, 275 species of birds of which 26 are endemic in the Albertin Rift and 3 are on the red list of the IUCN (*Bradypterus graueri*, *Crypto spiza shelleyi* and *Apdis argentea*), 32 amphibian and 38 reptile species and 1068 plant species of which 140 species of orchids, 260 species of ligneous and herbaceous plants, 24 species of trees. Many of these animals are restricted-range species that are only found in the Albertine Rift montane forests ecoregion in Africa. In fact, the number of endemic species found here is greater than in any other forest in the Albertine Rift Mountains that has been surveyed. The forest, which reaches its maximum altitude of 3000 metres above sea level, is of particular interest for the presence of colonies of chimpanzees (Pantroglodytes-Blumenbach, 1775) and Angola colobus (Colobus angolensis - Sclater 1860).

Akagera National Park

The savannah in the North Eastern Rwanda is used as the Akagera National Park; it covers 900km² situated between 1300-1825 m of altitude. This park was created in 1934 to protect animals in three ecoregions: savannah, mountain and swamp. Conserving biodiversity in this ecosystem has been challenging due to increasing pressures, potential loss of habitat and species or lack of up-to date data, etc.

This park has a set of compounds that define its high importancy, the Akagera major components are: Forest fringed lakes, papyrus swamps, savannah plains and rolling highlands. Akagera has exceptional levels of biodiversity, partly due to its position at the confluence of different vegetation zones. The extensive systems of freshwater lakes and associated papyrus swamps form the largest protected wetland in central Africa. Its biodiversity has a double origin; both native and introduced species make the Akagera fauna and flora diversity.

The wildlife in the Akagera National Park comprises 90 species of mammals of which 47 species of big mammals, 530 bird species, 35 fish species, 9 species of amphibians and 23 species of reptiles. Four animal species are protected by the CITES (Convention on International Trade of Endangered Species) namely *Loxodonta Africana*, *Sincerus caffer*,

Panthera leo and *Tragelaphus oryx*. The flora of the Akagera National Park is diverse and 6 species of orchids are recorded. The ANP is dominated by the grass savannah and different species of acacia trees; the most found in the forest savannah.

Introduced 'Masai' giraffe, black rhino, elephant, buffalo, zebra and duikers are major herbivorous of the Akagera National Park. Whereas for the large predators only leopard (*Panthera pardus*) and hyaena (*Crocuta crocuta*) can still be found in the park. Although lion once occurred throughout Akagera, the population has been wiped out mostly through poisonings by cattle herders seeking to protect their livestock. A reduction in the prey-base due to heavy poaching would also have contributed to their demise. Smaller predators are still well represented with healthy populations of several mongoose species, *viverrid species*, serval (*Leptailurus serval*) and side-striped jackal (*Canis adustus*). Gishwati-Mukura National Park

Presently, Gishwati-Mukura forest reserve is known for a wide range of fauna, including four species of primates: the eastern chimpanzee, the golden monkey, the blue monkey, and the l'hoest's monkey (also known as mountain monkey); more than a dozen species of East African chimpanzees; mammals such as red river hog, the black-fronted duiker, the southern tree hyrax, among others. Conservationists have also reported seeing the black and white colobus, another species of primates. The forest reserve also boasts about 60 species of trees, including indigenous hardwoods and bamboo. Gishwati and Mukura natural forests were originally earmarked as forest conservation zones in 1933.

According to the draft law of October 15, 2014, the Gishwati-Mukura National Park will cover a total surface area of 3,427.46 hectares with Gishwati forest (1,439.72 hectares) and Mukura forest (1,987.74 hectares). The government has also dedicated an area covering 992.48 hectares to a subsequent buffer zone to deter human encroachment. Over the past decades, the Gishwati-Mukura area was nearly depleted largely due to resettlement, livestock farming and smallholder farms in the aftermath of the 1994 Genocide against the Tutsi.

Relic forests and gallery forests

The Gishwati forest that covered 21.000 ha before 1981, consisted of only 600 ha in 2002. The natural forest of Mukura that stretches on 3.000 ha in 1960 covered only 800 ha in 2002. Regarding tree species and altitude, it is similar to that of Gishwati (2000~3000 m). Relict forests and savannahs in the East are located around the Akagera Park and have a variety of endemic and rare species whose majority is used in traditional medicine. Gallery forests accommodate an important biodiversity with endemic and rare species. That is for instance the case of the *Blighia unijugata, Grewia forbese, Rhus vulgaris, Pterygota mildbraedii* and *Ficus sp.*

In general, for a period of about 40 years, the surface area of the natural forests of Rwanda underwent a decrease of about 65% between 1960 and 2002. The search for arable lands, extensive farming, illegal felling of forests for firewood, production of wood for charcoal and poles for building in urban areas, as well as a land

mismanagement have drastically contributed to the reduction of the surface area of forests.

3.7.3 Biodiversity of wetlands

The ecosystems of the Rwandan wetlands inhabit a rich biological diversity in terms of vegetation and animal species (more than 104 plant species have been identified), except for Lake Kivu, Bulera and Ruhondo that have some liminologic problems.

The Lake Kivu contains a very poor aquatic flora and the density of the phytoplankton is relatively low due to the lack of mixture of layers with a biozone limited at 60 m to 70 m (the nutrients are found at the bottom of the lake). The ichthyologic fauna is also poor with 31 fish species due the volcanic origin of the lake.

Most lakes of the Akagera National Park are very rich in biodiversity with phytoplankton, fish species and ornithological fauna. The flora is dominated by the Cyperus, Phragmithes, Phinix, etc. The Water Hyacinth (*Eichornia crassipes*) is present and has started spreading covering more important surfaces of the lakes, thus posing a threat to their biological diversity. Some lakes like Cyambwe, Rwampanga and Rweru are particularly rich in hippopotamuses and crocodiles. One can also find many other lakes such as Nasho, lakes of Gisaka and Bugesera that contains phytoplankton that is very rich in biodiversity and flora that is mainly dominated by papyrus with *Cyperus papyrus* mixed with Miscandium violaceum and *Nymphea nouchallii*. All these lakes are associated with gallery forests onshore or on small islands.

Concerning the Northern lakes (Bulera and Ruhondo), the aquatic flora and fauna are poor due to the physico-chemical situation unfavourable to their development and the isolation of the two lakes. The concentration of the plankton is less important in Lake Bulera than in Ruhondo. They have 48 species grouped in 4 families (*chlorophyceous, Cyanophyceous, pyraphytes* and *bacillariophyceous*). Lake Muhazi is land locked, isolated, and its ichthyologic fauna is very limited. One can find three endemic species and other nine introduced from outside. The lake is very rich in phytoplankton.

The macroflora of the marshes is mostly composed of wide spaces of papyrus with some zones of *Miscanthidium*. The low layer is covered with *Cyclosorus stratus*. The fauna of big rivers and associated marshes comprises ungulates, carnivores, primates, rodents, lagomorphous, insectivorous and birds.

3.7.4 Biodiversity in agricultural systems

Demographic pressure and intensive agricultural practices in combination with diversified agro-pastoral practices; deforestation, bush fires and urbanization have disrupted the ecosystem functions. These changes caused secondary formation consisting essentially of graminaceous plants, numerous seasonal or perennial species alternating with crops.

Agricultural arable land presently covers around 52% of the total surface area of the country and is permanently cultivated (RNRA 2012). The time between two growing seasons is the only period of respite. These areas have various crops that play an essential

role in the national economy. These crops are usually grouped in two categories: subsistence and cash crops.

Some of the food crops include; sorghum, beans (*Phaseolus vulgaris*), eleusine (*Eleusine corocana*), Colocases (*Colocasia antignorum*), maize (*Zea mays*), rice (*Oryza sativa*), wheat (*Triticum sp*), barley (*Hordeum vulgare*), peas (*Pisumsativum*), soya bean (*Soja hispada*), peanut (Arachis *hypogea*), sweet potato (*Ipomea durcis*), potato, cassava (*manihot esculanta*) and banana (*Musa*). The importance of each crop varies according to regions.

Some crops, like bananas, potatoes, different varieties of wheat, sorghums and beans are subject to high commercial trade. Potatoes, beans, cassava and bananas are present everywhere for the daily diet of the people. The cash crops are very few. They are limited to coffee, tea and pyrethrum.

3.7.5 Pastoral zones

In Rwanda, the essential part of animal husbandry is limited to the family and a small number of animals per household. As agriculture occupies the biggest portion of land, the cows graze in paddock, some parts of marginal lands and limited pasturelands mainly Gishwati national reserve and Umutara. This obliges farmers to adopt the semi-permanent farming and grow fodder crops such as *Tripsacum laxum, Setaria spp, Desmodeum spp, Pennisetum purpureum, Mucuna pruriensis, Cajanus cajan, Calliandra calothyrsis, Leucaena diverifolia, Sesbania sesban,* etc.

These areas are prone to bush fires, trampling and sometimes overgrazing. The latter is the main cause of reduction of the biological diversity as it exterminates the most precious species along with pyrophyle species with small bromatologic value such as *Eragrostis spp, Sporobalus spp* and *Digitaria spp.*

3.7.6 Woodlands

Tree planting in Rwanda was limited to some plants around households such as Ficus thoningii, Euphorbia tirucalli, Erythrina abyssinica, Vernonia amygdalena, Dracaena afromontana, etc., but the cultivation of woody perennials for timber, energy generation or other services was not part of the customs. That resulted in a massive exploitation that quickly proved its limits.

The first forest plantations were created in 1920 and 1948 and only consisted of Eucalyptus. Later on, other species were introduced. These were namely Pinus spp, Callistris spp, Grevillea robusta, Cedrella spp, Cupressus. The Arboretum of Ruhande (RAB Station) has 206 species among which 146 feuillus, 56 resinous and a species of bamboo. Those species proved to be dangerous for the biological patrimony because they used to drain and acidify places that are already acid, what caused the reduction or even the extermination of the undergrowth. Thus planting those species would lead to erosion. The covered surface area was estimated at 256,300 hectares in 1998. Despite efforts of diversifying tree species, we estimate that 99% of trees consisted of Eucalyptus spp.

3.8 Socio-Economic Background

3.8.1 Population and Demographic Characteristics

The 2012 census shows that the population of Rwanda has reached 10.5 million with a density of 416 inhabitants per km2, which makes it the highest population density in Africa (RoR_MINECOFIN, 2012). In spite of this, the 2012 census shows that the annual population growth slowed from 3.2% in 2002 to 2.6% in 2011. Moreover, it shows that the population below 40 years of age living in rural areas has declined from 90% in 2002 to 83% in 2011 (RoR_MINECOFIN, 2012; see also Rwanda Statistical Yearbook, 2014).

Table 3: Evolution of Population Census (Rwanda statistical yearbook 2014)

Indicators	1978	1991	2002	2010
Population				
Total Population (both males and females)	4,831,527	7,157,551	8,128,553	10,515,973
Males	2,468,350	3,488,612	3,879,448	5,064,868
Females	2,468,350	3,668,939	4,249,105	5,451,105
Population density	184	272	321	416

Source: Rwanda Statistical Yearbook, 2014

The slowdown of annual population growth is the results of a number factors including the decline in the fertility rate from 6.00 in 2006 to 4.6 in 2011, increase number of use of married women using modern contraceptive methods for family planning, etc. (see table 3 below). The social indicators related to health have improved with life expectancy of 64.4 years in 2012 compared to 51.2 in 2002 (Rwanda statistical yearbook, 2014), and infant mortality of 107 per 1000 live births compared to 27 in 2000 (see table 4 below).

The HIV/AIDS prevalence rate has declined from 13.7% in 2000 to 3% in 2012. Malaria has also considerably declined due to effective preventive measures including distribution of mosquito nets to the population at a rate of 82.70% in 2012 compared to 18.20% in 2006 (see Rwanda statistical yearbook 2014; RoR, MINECOFIN, 2012). As illustrated in the tables below so many other indicators show that health and socio-demographic conditions have generally improved in the recent years. The table below gives details about health and demographic incidence of malaria and HIV.

Table 4: DHS Indicators from 1992 to 2012 (see Rwanda statistical yearbook, 2014)

Indicators	1992 DHS-1	2000 DHS-II	2005/06 DHS-III	2007/08 IDHS	2010/11 DHS-IV
Fertility					
Total fertility rate	6.20	5.80	6.00	5.50	4.60
Median at first birth			22.00	22.30	22.40
Teenage fertility	13.00	4.00	10.00	27.00	45.10
Family Planning					
The use of modern contraceptive methods	13.00	4.00	10.00	27.00	45.10

among the currently married women					
Unmet need for family planning		17.00	39.00		18.00
Child Health					
Vaccination	86.00	76.00	75.00	80.40	90.10
Infant mortality rate(per 1000 live births)	85.00	107.00	86.00	62.00	27.00
Child mortality rate	151.00	196.00	152.00	103.00	76.00
Underweight	29.00	24.00	23.00		11.00
Maternal Health					
Maternal mortality rate (per 100,000)		1071.00	750.00		476.00
Assistance during delivery	25.00	26.00	28.00	45.20	69.00
Adolescent birth rate (% total live birth)			4.20		4.10
Antenatal care coverage (at least one visit)		92.50	94.40		98.00
Antenatal care coverage (at four visits)		10.40	13.30		35.40
Malaria					
Prevalence rate in children					1.40
Prevalence rate in women					0.70
Ownership of mosquito nets			18.20	59.10	82.70
HIV prevalence rate		13.70	3.00		3.00

Source: Rwanda Statistical Yearbook, 2014

3.8.2 Literacy and Education Evolution

Socioeconomic conditions of Rwandan population have generally improved. The education and literacy for instance have considerably improved such a way that MDGs and EDPRS1 have been reached. The adult literacy increased from 52.40% in 2000 to 69.70% in 2011 and that of the youth reached 83.70%. Figures show that the access to primary and secondary schools is at a great level. The proportion of population that ever attended school has increased from 78.90% to 80.20% and the total number of net primary enrolment has reached 91.7%. In primary education, only 0.31% of increase was has counted in student enrolment. In secondary education, the enrolment has doubled with 20.9% in 2011 compared to 10.2% in 2000 (see details in table below).

3.8.3 Economic Development Evolution

Despite the efforts in declining the on-farm activities by increasing off-farm income generating activities, the Gross Domestic Product of Rwanda is still dominated by the agricultural sector (RoR_MINECOFIN, 2012). The lowest Gross Domestic Product (GDP) per capita is estimated at 644 USD approximately equivalent to 463,700 FRW (see Rwanda Statistical Yearbook, 2014). The real growth of the GDP has increased from 6, 5% in 2006 to 8.2% in 2012 due to substantial improvement of varied socioeconomic

activities. For instance, during the EDPRS 1, services sector grew at an average rate of 10 % per year, and the industrial sector grew at an average of 9.8% per year and contributed 20% of total growth, while the agriculture sector contributed 32.7% of GDP and 28% of total growth with an average of 5.4% (Ibid.). In the effort to reduce poverty and food insecurity countrywide, the government of Rwanda supported agriculture sector by using fertilizers and improved seeds, particularly maize, voluble beans, soya beans, wheat, rice, etc. For instance, from 2006 to 2011, use of fertilizers tripled in tonnage terms, and the share of marketed agricultural output increased from 21.5% to 26.9%. At the same time, the number of off-farm jobs increased by 50- 60% (see RoR_MINECOFIN, 2012; see also Rwanda Statistical Yearbook, 2014).

3.8.4 Achievements and Challenges post EDPRS1

In spite of considerable growth in service, industrial and agricultural sectors during EDPRS1, Rwanda is facing a number of challenges. For instance, extreme poverty remains high and persistent in rural areas with 48.7% compared to 22.1% in urban areas, and female are the most affected in both areas (see EICV3 report); environmental degradation due to limited arable land in a densely populated country with 83% of rural population dependent on subsistence agriculture (RoR_MINECOFIN, 2012; Rwanda Statistical Yearbook, 2014).

3.8.5 Industry and Mining

The industrial sector of Rwanda is modest and recent: 78% of industrial companies were created between 1964 and 1987. In 2013, the contribution of the industry sector to the GDP was of 15% of which the major part was from the agro industry and the rest from small and medium size of companies which produce consumption goods in replacement of importation by using simple technologies. The mining has contributed only 2% of the GDP in 2013, (Statistic Yearbook, 2014).

One of the major problems is related to the location of industrial units as some of them are installed near residence houses, others in valleys (wetlands). These installations are sometimes sources of pollution because of their wastes, liquid (waste waters) or gaseous (dust, smoke, smell), and noise.

The mining policy covers not only mineral extraction, processing and export, but also quarrying, production of construction materials and extraction and processing of semi-precious stones. The mining sub-sector has registered some key achievements. It is one of the major sources of income to the country with revenue from minerals exportation. However, the exploitation of mines and quarries is often a source of water pollution due to contamination linked with the absence of wastewater purification, modern practices of exploitation and soil erosion.

3.8.6 Human settlements

The Rwandan settlement pattern has been scattered since time immemorial. It has for long been characterized by the traditional use of land associated with the ancestral lifestyle but which does not correspond any more to the present environmental and economic constraints. It is in that perspective that the present policy of the Government

of Rwanda regarding settlement consists of encouraging a clustered habitat commonly known as *Imidugudu.*

In most urban areas, Rwanda has not yet developed city master plans. There are only plans of different towns of which some have expired and need updating. Urban centers developed spontaneously without taking environmental aspects into consideration. Sanitary facilities are insufficient and sometimes inadequate in city centers. In suburban zones known as spontaneous quarters, solid wastes are piled in disorder, drinking water is rare, and rain water draining gutters are insufficient. Thus diseases are frequent in those areas, the degradation of environment is more pronounced and living conditions are poor.

3.8.7 Physical Cultural Resources

Rwanda's physical cultural resource, seen from a general perspective, is rich and diversified. But it has, for long, been regarded as being a sector of minor importance, and, because of such consideration, failed to play its basic role of developing the nation.

However, there is no doubt physical cultural resource is one of the main pillars for sustainable development. Rwanda's physical cultural heritage is rich and diversified; it contains:

- Sacred hills, forests and trees with legendary history;
- Traditional huts and royal palace;
- Churches and other colonial buildings;
- Caves and rocks with bas-reliefs marking the legendary or historical events that have occurred on the site;
- Thermal springs and wells used for ritual purposes;
- Genocide memorial sites;
- Designated burial sites which are located in different sectors

Protection and preservation of national cultural heritage consolidate national unity, social cohesion, cultural freedom and recognition of community identity.

Therefore, Government of Rwanda and its partners have the obligation to preserve and perpetuate this physical cultural heritage for present and future generations because, on the one hand, it brings in a lot of money as do agriculture, industry, gold or oil and, on the other, it maintains harmony and social balance between peoples. This implies, the project will undertake the Chance Finds Procedures in addressing possible encounters of any archaeological resources during project implementation.

3.8.8 Agriculture

The agriculture production system is based on small family exploitations whose production is consumed by the owners at more than 80%. The systems of crops are complex, based on the diversification of productions and the association of crops. Seven main crops, namely banana, bean, sweet potato, cassava, sorghum and potatoes, of which the first five are present in 90 % of production units and constitute the common basis for all the regions of Rwanda.

Great investments in modern agriculture and research-based agriculture using fertilizers and improved seeds on consolidated lands, pumping irrigation on hillsides, etc., have allowed great productions of maize, soya beans, voluble beans, wheat, irish potatoes and rice. This achievement results in MINAGRI's decision of putting in place specialized centers for policy implementation and research such as RADA, RARDA, RSSP, RAB, etc.

The recent survey has proved that the agriculture is the most important sector of the Rwandan economy and contributes considerably to poverty reduction. For instance, from 2011 to 2013 the total production of vegetables increased by 9% and their exports while fruits production increased by 18%. Their exports counted an increase from 15.4 ('000 Tons) in 2012 which generated 5,013,260 USD to 31.9 ('000 Tons) which generated 9,494,442 USD (see Rwanda Statistical Yearbook, 2014).

However, the extensive agriculture practiced by the majority of Rwandan population contributes to the degradation of environment. Moreover, the agricultural intensification at the level of projects was often realized without taking into account environmental drawbacks accrued from inputs like (mineral fertilizers, pesticides, herbicides and used techniques).

3.8.9 Animal husbandry

The pastures consisted mainly of family fallows and marginal lands considered as inappropriate to agriculture such as the undergrowth. The limited subsisting pastoral areas were badly used because farmers did not master the management of pastures. That was showed by the overgrazing and overexploitation caused by trampling, degradation and disappearance of vegetation cover. The MINAGRI policy of keeping cattle in shed known as "zero grazing" program has significantly limited environmental degradation and crops damage, which was also a source conflicts between neighbors.

Moreover, the demographic pressure has progressively led to the semi intensification or intensification of fodder resources used to feed animals. Hence, animal husbandry, essentially made of cattle, was progressively transformed. This resulted in considerable increase of milk production from 257,450 in 2008 to 628,266 tons in 2013 and beef meat production increased from 24,889 to 29,807 tons in 2013 (see Rwanda Statistical Yearbook, 2014). Animal husbandry has also contributed to poverty reduction through a RARDA-MINAGRI program called "One Cow per Every Poor household in Rwanda". This program has decreased the number of malnourished children countrywide and has considerably contributed to poor household food security.

3.8.10 Electrical Coverage and Renewable Energy

Rwanda's energy consumption is dominated by biomass that accounts for about 85% of primary energy use while petroleum accounts for 11% and electricity for the remaining 4%. Despite its low share in the present energy mix, the electricity sector is considered as a critical factor in enabling socio-economic development, and as the main vehicle for energy diversification. At the same time, it is noted that Rwanda has by far one of the lowest per-capita electricity consumptions in the world; Rwanda consumes about 42 kWh/year/capita compared with 478 kWh in sub-Saharan Africa and 1,200 kWh for

developing countries as a whole. Although Rwanda's densely distributed population should facilitate network expansion and access to electricity, presently only 16% of Rwanda's households (350,000 customers) are connected to the grid.

With such a low level of electricity consumption, there is a sizeable need for additional electricity services. Projections of electricity demand are therefore reflective of government targets rather than behavioral factors that normally affect power demand. Based on the targets set by the EDPRS and the Vision 2020, peak demand was expected to grow from 51 MW in 2008 to 204 MW in 2015 and 328 MW in 2020. Extrapolation of the envisaged trend would result in a peak load of 500 MW by 2025. These figures were the basis of the extensive analysis that was carried out while preparing the Electricity Master Plan in 2009-2010. However, the new cabinet that was formed in October 2010 decided to accelerate the expansion of electricity services. A new target was set to reach an access ratio of 50% by 2017 (as compared with an access ratio of 28% set by Vision 2020). Extension of the envisaged trends would imply that electricity access would reach 94% by 2025 (as compared with the 40% goal set by Vision 2020). Accordingly, the number of household connections to the grid is expected to increase from about 350,000 in 2012 to 1,200,000 in 2017 and 2,400,000 in 2025. This target was further pushed up in February 2012 with a government desire to reach 70% access by 2017.

The new target would also include electricity supply by 2017 to 100% of schools, 100% of health facilities and 100% of public sector offices either through connection to the grid or through reliable off-grid systems. With these targets, the peak demand and electricity consumption are forecast to grow at about 12.0% and 11.6% p.a. respectively from 2010 to 2020.

Projection of electricity demand depends very much on the assumptions about the progress toward the target for increasing household access as well as growth in industrial and commercial uses of electricity. The Electricity Master Plan (2011) provides the basis of demand projections under a scenario that electricity access may reach 35% by 2017.

The residential and non-residential demands are also disaggregated while electricity use by the industrial sector is considered to grow at about 25% p.a. The resultant demand for 2017 is then estimated at about 250 MW. The seven-year electricity development program uses a more aggressive growth rate for the overall electricity consumption (based on a 2017 access target of 50%) to arrive at an estimated peak demand of 350 MW for 2017. The most recent decision by the government to achieve 70% access by 2017 would imply total peak demand of up to 410 MW by 2017. Table 3.3 contains these various demand projections.

3.8.11 Domestic Energy Resources

Rwanda is rather well-endowed with domestic energy resources though most of these resources remain untapped. Energy sources for electricity generation include: hydropower; geothermal energy; methane gas; peat energy; solar energy; wind energy and waste energy.

Hydropower has generated the bulk of electricity in Rwanda since the 1960s. Its overall

potential is estimated at about 313 MW but currently (end-2012) the utilized hydro capacity is 64.5 MW. Rwanda's domestic small- and medium-size hydropower is estimated to have a total potential of about 117 MW and is located in specific sites such as Ntaruka, Mukungwa, Gihira, Gisenyi, Rukarara and Nyabarongo. Until recent years, the Ntaruka and Mukungwa hydropower stations represented Rwanda's main sources of electricity; they are located in the Northern Province and supplied by Lake Burera and Lake Ruhundo respectively. The design capacity of these hydropower stations is about 23.5 MW but actual generation declined to about a quarter of this level in the mid-2000s due to falling water levels. Between the years 2004 and 2005, prolonged droughts reduced the water levels significantly in the rivers and the lakes. This affected power generation in the Lake Victoria Basin and forced an increase in thermal electricity generation. The Rukarara power station, with a design capacity of 9 MW, was commissioned in 2010. A further Rukarara 2 plant (in the downstream of the river) with a capacity of 2 MW is scheduled for commissioning by end-2012.

The Nyabarongo hydro project with a design capacity of 28 MW represents another major plant which is under construction and due for commissioning in 2014, and the Akanyaru regional hydro project is expected to be commissioned in 2016 with a design capacity of 3.9 MW. Rwanda's Hydro Atlas (identified by MININFRA) shows 333 potential sites for mini and micro hydro-power plants with a capacity of between 50 KW and 1 MW each and total potential of 12.5 MW that could be tapped to supply electricity to the rural areas. This capacity would need to be verified after the relevant feasibility studies are carried out. There are currently more than 20 government-initiated and donor-supported projects that are aimed at supplying 11 MW of power to rural villages and towns. Micro hydropower is expected to contribute around 8 MW of additional generating capacity by 2017. Rwanda's share of regional hydropower is estimated at about 183 MW of which Rusumo Falls, on the border with Tanzania, and Rusizi III and Rusizi IV, on the border with the DRC, are scheduled for joint development with Tanzania/ Burundi and Burundi/DRC respectively. There are presently two operational plants on Rusizi with a total capacity of 15.5 MW. Two additional phases of Rusizi III (48 MW) and Rusizi IV (98 MW) are under active consideration. A preliminary estimate of the capital costs for Rusizi III and Rusizi IV are $150 million and $240 million respectively.

Also at the feasibility stage is the project at Rusumo Falls, with 20.5 MW of capacity and an estimated capital cost of $53 million. The development of the regional power projects would require interconnection between the Ruzizi sites and Kibuye (the connecting point to the grid) with an estimated cost of $28 million.

Gas (Methane). Natural gas is internationally considered a very desirable fuel due to its technical, economic and environmental advantages. In particular, it has become the fuel of choice for power generation internationally. Rwanda isendowed with an estimated 55 billion cubic meter (bcm) of usable methane gas found at the bottom of Lake Kivu, at a depth of 250 meters. A pilot plant was built in 1963 where some gas from the lake was produced and used as boiler fuel in the nearby BRALIRWA brewery. More recent pilot projects were commissioned in 2008 to 2011 with installation of the 4.2 MW Kibuye

Power 1(KP1) plant (available capacity of 1.8 MW). These pilots have demonstrated the technical and commercial viability of gas exploitation from the lake. A rather major undertaking has taken place with the development of the fi rst phase (25 MW) of the KivuWatt project that is under construction and was scheduled to be completed by 2013. The second phase of this project is expected to add 75 MW of capacity. The total potential of methane-based power is estimated at 350 MW.

Geothermal Energy. Geothermal power has the potential to provide a very suitable complement to Rwanda's other sources of energy. Geothermal power represents a stable and reliable source of supply that could also compensate for fluctuations in hydropower generation. Therefore, geothermal energy is low-risk and low-cost when commissioned. However, the main risk is at the exploration stage, when the size and quality of the resource needs to be proven.

This risk is particularly high in Rwanda where geothermal development is still at a very early stage. The Electricity Master Plan (2011) points out that Rwanda could have a geothermal energy potential of about 700 MW of which 490 MW are considered economically recoverable. However, these estimates need to be firmed up through detailed surface studies and exploration drilling although some surface reconnaissance studies have been done already in the western region (Gisenyi, Karisimbi and Kinigi).

There is a plan to carry out significant drilling in Karisimbi by-end 2013 and develop by 2017 four geothermal plants in Karisimbi and Gisenyi through power purchase agreements with the private investors. The envisaged configuration is that there will be a 10 MW pilot and four plants of 75 MW each providing a total of 310 MW by 2017.

Photovoltaic Market. Rwanda has a moderate source of solar energy with an average solar radiation of 4 – 6 kWh per square meter per day. Worldwide, development of solar energy in the form of grid-connected electricity is considered to be very costly even for countries that have more intense sunlight. However, the use of solar energy for electricity generation in isolated off-grid areas and for water heaters has proven to be economically viable. Rwanda has chosen a realistic track by focusing on the use of solar PV in two main areas: (i) electrification of clinics, schools and administrative offices in remote centers and (ii) solar water heating, substituting biomass and electricity water heating, with significant environmental and recurrent cost savings.

Since the EDPRS has identified as a key priority objective providing electricity access to the health centers and primary and secondary schools, a number of donors (EU, BTC, Global Fund, USAID, ICAP, PEPFAR) have shown interest and support. However, the support from various donors has not been implemented in a coordinated fashion. As a result, the corresponding projects have used a broad range of different technologies and standards. Also there has not been a notable effort to develop local capacity for maintenance.

A lack of skills for proper maintenance has led to a series of technical problems including

malfunctioning batteries, faulty wiring, and broken DC appliances.

Biomass. Rwanda's energy mix is dominated by biomass that accounts for about 85% of primary energy use while petroleum accounts for 11% and electricity for the remaining 4%. Biomass is derived from wood fuel, mostly used in rural areas in the form of firewood, and charcoal that are used in the urban areas for cooking. Although the dependency on biomass has dropped from 95% to 85% in the last 20 years, the ratio is still considered too high and harmful to forest resources. Accordingly, the Biomass Energy Strategy for Rwanda (2009) articulates the government's objective to reduce the consumption of biomass energy from the current 85 % to 50 % of national energy consumption by 2020. The Biomass Strategy considers a combination of substitution and efficiency improvement measures to reduce biomass use and mitigate the risks of deforestation. These measures include:

- Promotion of other energy sources for cooking and heating such as biomass briquettes (peat, papyrus, waste), kerosene (using efficient and safe pressure stoves and lights), LPG, solar water heating and electricity (for users in the high-end market)
- Expansion and improved management of plantations on a sustainable basis to support growing wood fuel and charcoal production
- Promotion of improved technologies for charcoal production and improved stoves to make more efficient use of biomass fuels
- Supporting the dissemination of biogas digesters to rural families where animal waste can be used and to schools, hospitals and other institutions where human waste can be transformed into biogas and slurry
- Encouraging the production of methane or other forms of energy from solid waste landfills or through gasification processes

Peat is considered a promising alternative source of energy. Rwanda has considerable peat reserves in Gishoma (western region), with an estimated reserve of 10 bcm, and at Akanyaru (southern province), estimated at 1.5 bcm. There are also some smaller reserves near Kigali. It has been noted that when peat is harvested and used as a fuel the stored carbon is released back into the atmosphere as carbon dioxide. However, in the post-production phase, the cutaway peatlands can be reclaimed for forestry or restored to wetlands, and once again become carbon sinks. The other global environmental benefit is that when peatlands are drained and developed, they stop the emissions of methane, which is a worse gas than CO2 in causing global warming. The present plans include development of 200 MW of peat-fi red power plants by 2017. The total potential capacity of peat-based power is estimated at 300 MW.

4 DESCRIPTION OF THE ADMINISTRATIVE, POLICY AND REGULATORY FRAMEWORK

This chapter outlines and highlights the relevant institutional and legal as well as policy framework in Rwanda which has a direct bearing on the Renewable Energy Fund Project (REFP). The chapter further highlights the World Bank Safeguard Operational Policies applicable to the project including a comparative analysis and gaps existing between the Bank's policies and host country regulations and suggestions on bridging the gaps. Finally, a section on international laws and conventions that bear relevance to the implementation of this project have also been highlighted in this chapter.

4.1 The Legal, Regulatory and Policy Framework

4.1.1 Constitutional provisions

The constitution states that all citizens have the right of equal access to public service in accordance with their competence and abilities. In the Constitution of the Republic of Rwanda of June 4th, 2003 as amended to date, article 49 states that every citizen is entitled to a healthy and satisfying environment. The law determines the modalities for protecting, safeguarding and promoting the environment.

Different policies and laws from the constitution, the Vision 2020, the PRSP and EDPRS and the National Decentralization Policy (the "Decentralization") take into account environmental aspects.

4.1.2 Vision 2020

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

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

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

4.1.3 Environmental Organic Law

The law sets out the general legal framework for environment protection and management in Rwanda. The law determines the modalities of protecting, conserving and promoting the environment. Chapter IV of the Organic Law Article 67 clearly calls for the need to subject projects to mandatory Environmental Impact Assessment (EIA). Article 65 further specifies that every project shall be subjected to EIA prior to its commencement.

Article 70 states that the Ministerial order establishes the list of projects for which the public administration shall not warrant any authorization **Environmental (Impact Assessment and Audit) Regulations 2003** without an EIA describing direct and indirect consequences of the project to the environment.

4.1.4 Law Governing Electricity

Rwanda's draft Electricity law was enacted into law in June 2011 and gazetted in July 2011. The law on electricity governs the activities of electricity power production, transmission, distribution and trading both within and outside the national territory of Rwanda.

The primary objectives of the law are:

- Liberalization and Regulation of electricity sector;
- Harmonious development of power supply for all population categories and for all the country's economic and social development sectors in the framework of laws in force.
- Setting up economic conditions enabling electric power sector investments.
- Respect for the conditions of fair and loyal competition and for the rights of users and operators

The Electricity law gives the Ministry in charge of electricity the rights to provide concession Agreements to firms and provides the legal basis for the Rwanda Utility Agency (RURA) to approve and grant licence holders. Article 7 and 8 state that any activity of production, transmission, distribution, and trading of electric power within and outside the national territory of the Republic of Rwanda shall be subject to a license issued by RURA and the latter shall ensure, prior to the issuance of a license, that the concerned individual or institution shall respect the rights of users and environment protection.

The law specifies that the electricity market of Rwanda shall be a single market base on free and open third party access to the transmission and distribution networks based upon the principles of regulated access to ensure a transparent and non-discriminatory market place. The law authorizes the insurance of an International Trade Licence for the import and export of electric power across the borders of Rwanda and for the supply and sale to eligible customers in conformance with sector policies and other laws in force.

4.1.5 Labor Code

In accordance with the Labour Code, an employer is responsible to maintain health and safety of the workers at workplace. Employer is required to keep the workplace in a common state of cleanliness and presentation of hygiene and safety necessary for the health and safety of workers.

The employer may also create a committee on health and safety at workplace and devise modalities for its functioning. Workers must also be provided with a first aid box, needed in case of emergency. In case of work accident, the employer must evacuate the injured and take them to the nearest health centre.

An employer is required to ensure the health, safety and welfare of all persons working in his/her workplace. Employer is required to: provide workers with work premises and tools appropriate for the work; assure workers of the reliable and timely renewal of collective and individual means of protection; conduct a risk and hazard analysis and take effective protective measures; inform employees about any risks likely to result from the use of technologies and any other imminent danger; ensure that safety information is displayed in readable language in all premises; make no deductions from an employee's remuneration or charge an employee in respect of anything done or provided in pursuance of the order on OSH; and notify the labour inspectors of any dangerous occurrence or occupational accident within four days of such incident.

An employer is obliged to train workers on health and safety at workplace and correct use of equipment. The Workplace Health and Safety Committee is responsible to provide advice on health and safety training programmes and adjustment of such programmes; to examine documents specifying, for each training activity, the duration and the means allocated to achieve it and to ensure its effective implementation; and to ensure that all appropriate measures are taken to provide training of workers and upgrade their skills in the field of occupational health and safety.

4.1.6 Law N°10/2012 of 02/05/2012 Governing Urban Planning and Building in Rwanda

The law establishes the basis applicable to urban planning and building in Rwanda.

4.1.7 Law N°20/2011 of 21/06/2011 Governing Human Habitation in Rwanda

The law governs land occupation and construction on land reserved for human habitation. It defines the human settlements and criteria of an area reserved for human settlement.

4.1.8 Building Code

The Rwanda Building Code is published as Annex 2 of the Ministerial Order N° 04/Cab. M/015 of 18/05/2015 Determining Urban Planning and Building Regulations. It is a performance based code, integrating any technology and material for use in construction when fulfilling minimum performance requirements. It establishes such minimum requirements to safeguard the public health, safety and general welfare by regulating and controlling the design, construction, quality of materials, sanitation, lighting and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment, use and occupancy, location and maintenance

of all buildings and structures in Rwanda. The Building Code makes reference to requisite national, regional and/or international standards and/or code of practice.

4.1.9 Organic Law (Land)

Article 3 of this law stipulates that land is part of the public domain of all Rwandans; ancestors, present and future generations. With exceptions of the rights given to people, the state has supreme powers to manage all the national land. This is done in the public interest aimed at sustainable, economic development and social welfare, in accordance with procedures provided for by law. In that regard, it is the state that guarantees the right to own and use the land. The state also has rights to expropriation due to public interest, settlement and general land management through procedures provided by law and after appropriate compensation.

Article 4 requires that any person or association with legal personality has the right over the land and to freely exploit it as provided for by this organic law in Articles 5 and 6. Any discrimination either based on sex or origin in matters relating to ownership or possession of rights over the land is prohibited. The wife and the husband have equal rights over the land.

Under Article 7, the rights over the land acquired from custom and the rights acquired from written law are equally protected. According to the law, all owners of land acquired from custom (persons who inherited the land from their parents), those who acquired it from competent authorities or those who acquired it through any other means recognized by national custom whether purchase, gift or exchange have rights over the land.

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

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

4.1.10 Expropriation Law

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

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

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

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

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

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

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

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

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

4.2 Relevant Institutions-Environmental and Social

4.2.1 Rwanda Environment Management Authority

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

REMA is also tasked to coordinate different environmental protection activities undertaken by environmental promotion agencies; to promote the integration of environmental issues in development policies, projects, plans and programmes; to coordinate implementation of Government policies and ensure the integration of environmental issues in national planning among concerned departments and institutions within the Government; to advise the Government with regard to the legislation and other measures relating to environmental management or implementation of conventions, treaties and international agreements relevant to the field of environment as and when necessary; to make proposals to the Government in the field of environmental policies and strategies.

Role in Project: -REMA will play a significant role in ensuring that the activities related to this project have no adverse impact on the environment. This is as a result of their key mandate of ensuring environmental protection. They will monitor project activities based on the ESIA/ESMP prepared and ensure that the mitigation measures in the ESMPs are followed.

4.2.2 Ministry of Natural Resources

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

Role in Project: -MINIRENA's role in this project is not significant and will only be necessary in the event there is need to draft or amend policies which may affect the project positively or negatively.

4.2.3 Rwanda Development Board

Rwanda Development Board (RDB) is a one stop institution bringing together several government bodies focused at promoting investment in Rwanda. The authority is charged with administering the ESIA process and works with other institutions in the process. RDB has created a department of EIA responsible for reviewing all projects EIA before approval; a duty that was previously undertaken by REMA. With regard to environmental safeguards, RDB plays the following roles:

1. Review Project Briefs so as to advise on Terms of Reference,
2. Provide information or advice to developers and EIA Experts when consulted during EIA process,
3. Review EIA reports and provide comments to the developers
4. Organizing public hearings,
5. Issue certificate of approval

Role in Project: -The role of RDB in this project include the points 1-5 highlighted above.

4.2.4 Ministry of Local Government

Under the framework of decentralization, MINALOC oversees the implementation of the decentralization process as well as relevant community and social protection programmes. This Ministry is also responsible for environment governance and therefore for mobilizing the public to participate in the management and protection of natural resources. The National Decentralization Policy adopted in May 2000 holds local populations responsible for managing resources, including natural resources.

Districts are responsible for protection of public infrastructures and the environment. Similarly, cities, towns, and villages are responsible for land and environmental management, urban planning, road maintenance and energy and water resources management. MINALOC is over-seeing various community development related programme in the districts. MINALOC is engaged in ensuring the development of rural areas through the implementation of settlement policies and ensuring their access on basic infrastructures through advocacy and collaboration with various stakeholders in different sectors including the energy sector.

Role in Project: -The role of MINALOC in this project will be to ensure that as per its mandate, activities of the project at the district level do not adversely affect the environment. Under Rwanda's devolved system of governance, local governments are responsible for among others environmental protection at district level and have environmental officers who ensure this mandate.

4.3 Autonomous and Semi-Autonomous Government Agencies

4.3.1 Rwanda Utilities Regulatory Authority

Rwanda Utilities Regulatory Authority (RURA) is a national institution established by the Law N°39/2001 of 13/09/2001 for the Regulation of Certain Public Utilities including energy sector. RURA has a legal personality and autonomy in the management of its finances, assets and employees and has its own official seal and regulates; public utilities regulated by RURA are Energy, Telecommunications, Water and Sanitation, and Transport.

The legal mandate under energy

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

Role in Project: In this project, RURA will ensure that its mandate as highlighted in points 1-6 above are ensured and implemented by all sub project implementing agencies.

4.3.2 Rwanda Energy Group (REG)

The Rwanda Energy Group Limited (REG Limited) and its two subsidiaries; The Energy Utility Corporation Limited (EUCL) and The Energy Development Corporation Limited (EDCL) entrusted with energy development and utility service delivery. The Rwanda Energy Group Limited was incorporated to expand, maintain and operate the energy infrastructure in the country through its two subsidiaries the Energy Utility Corporation Limited (EUCL) which is the implementing entity and the Energy Development Corporation Limited (EDCL).

It has to ensure focused attention to enhancing efficiency in utility operations on one hand and ensure more timely and cost efficient implementation of development projects on the other. Moreover, the REG holding structure provides the overall coordination and ensures effective development of energy and investment plans. REG ensures the effective implementation of Government policies, monitoring the execution of strategic plans; improvement of service delivery and effective project execution by the subsidiaries. It also plays a coordination role to ensure the smooth interrelationships of the two subsidiaries.

The REG holding company plays an interfacing role between government policies enforcement and subsidiary companies' sustainable management. REG's key role is to ensure timely execution of the actions under the National Strategic Plan by the subsidiary companies while at the same time ensuring that the government provides appropriate economic resources to each subsidiary.

Role in Project: All energy investment plans must be coordinated by the REG and therefore, the sub projects under the SREP must be in line with the REG investment plans.

4.3.3 Energy Development Corporation Limited

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

Role in Project: All the proposed sub projects under the SREP must be part of EDCL's effort towards increasing investment in development of new energy generation and beyond that, EDCL will play a significant role in ensuring that sub projects are cost efficient.

4.3.4 Energy Utility Corporation Limited

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

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

The Company has four main processes feeding into the core business; Policies planning, Marketing planning and development, Distribution planning and development within already electrified areas and Operation and Maintenance of Power Plants and Transmission and Distribution Networks owned by the Utility. The utility will also play a key role in the execution of Power Purchase/Power Sales Agreements with IPPS and other regional utilities for import and export.

Role in Project: UECL role in this project will be to ensure that the sub projects providing energy especially mini grids are properly operated and maintained. UECL will also ensure that there is adequate distribution network of energy generated and that the energy is retailed to consumers. The detailed roles are highlighted in the sections above.

4.3.5 Rwanda Housing Authority

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

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

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

Role in Project: The RHA is responsible for developing and determining building codes including setting of electricity networks to conform with urban planning. RHA will be important in this project with respect to guiding electricity distribution and transmission networks in urban settings.

5 DESCRIPTION OF WORLD BANK ENVIRONMENTAL AND SOCIAL SAFEGUARDS POLICIES AND TRIGGERS

Table 5 below shows the Banks safeguards policies in general and table 6 highlights the specific safeguards that are triggered as a result of the proposed project.

Table 5: Summary of World Bank's Safeguards Policies objectives including when they are triggered

Policy	Objective	Trigger for the Policy
OP/BP 4.01 Environmental Assessment	The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and transboundary and global environment concerns.	Depending on the project, and nature of impacts a range of instruments can be used: EIA, environmental audit, hazard or risk assessment and environmental management plan (EMP). When a project is likely to have sectoral or regional impacts, sectoral or regional EA is required. The Borrower is responsible for carrying out the ESIA.
OP/BP 4.04 Natural Habitats	This policy recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and most native species. This bank policy prohibits financing for developments that would significantly convert or degrade critical natural habitats, and preference is on siting projects on already converted land.	This policy is triggered by any project (including any sub-project under a sector investment or financial intermediary) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).
OP/BP 4.36 Forests	The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank assists borrowers with the establishment of environmentally appropriate, socially	This policy is triggered whenever any Bank-financed investment project (i) has the potential to have impacts on the health and quality of forests or the rights and welfare of people and their level of dependence upon or interaction with forests; or (ii) aims to bring about changes in the management, protection or utilization of natural forests or plantations.

Policy	Objective	Trigger for the Policy
	beneficial and economically viable forest plantations to help meet growing demands for forest goods and services.	
OP 4.09 Pest Management	The objective of this policy is to (i) promote the use of biological or environmental control and reduce reliance on synthetic chemical pesticides; and (ii) strengthen the capacity of the country's regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. More specifically, the policy aims to (a) Ascertain that pest management activities in Bank-financed operations are based on integrated approaches and seek to reduce reliance on synthetic chemical pesticides (Integrated Pest Management (IPM) in agricultural projects and Integrated Vector Management (IVM) in public health projects. (b) Ensure that health and environmental hazards associated with pest management, especially the use of pesticides are minimized and can be properly managed by the user. (c) As necessary, support policy reform and institutional capacity development to (i) enhance implementation of IPM-based pest management and (ii) regulate and monitor the distribution and use of pesticides. Pesticides in WHO Classes IA and IB may not be procured for Bank supported projects.	The policy is triggered if : (i) procurement of pesticides or pesticide application equipment is envisaged (either directly through the project, or indirectly through on-lending, co-financing, or government counterpart funding); (ii) the project may affect pest management in a way that harm could be done, even though the project is not envisaged to procure pesticides. This includes projects that may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk; (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and/or pose significant health or environmental risks.
OP/BP 4.11 Physical Cultural Resources	The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community.	This policy applies to all projects requiring a Category A or B Environmental Assessment under OP 4.01, project located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources.
OP/BP 4.10 Indigenous Peoples	The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples; (ii) ensure that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and (iii) ensure that indigenous peoples receive culturally appropriate and gender and inter-generationally inclusive social and economic benefits. The policy requires free, prior and informed consultation with indigenous peoples.	The policy is triggered when the project affects the indigenous peoples (with characteristics described in OP 4.10 para 4) in the project area.
OP/BP 4.12 Involuntary Resettlement	The objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; (iii) encourage community participation in planning and implementing resettlement; and (iv) provide assistance to affected people regardless of the legality of land tenure.	This policy covers not only physical relocation, but any loss of land or other assets resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, whether or not the affected people must move to another location.

Policy	Objective	Trigger for the Policy
		This policy also applies to the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.
OP/BP 4.37 Safety of Dams	The objectives of this policy are as follows: For new dams, to ensure that experienced and competent professionals design and supervise construction; the borrower adopts and implements dam safety measures for the dam and associated works. For existing dams, to ensure that any dam that can influence the performance of the project is identified, a dam safety assessment is carried out, and necessary additional dam safety measures and remedial work are implemented.	This policy is triggered when the Bank finances: (i) a project involving construction of a large dam (15 m or higher) or a high hazard dam; and (ii) a project which is dependent on an existing dam. For small dams, generic dam safety measures designed by qualified engineers are usually adequate. Dams with ≥15m in height review by an independent dam safety panel is required.
OP 7.50 Projects in International Waters	The objective of this policy is to ensure that Bank-financed projects affecting international waterways would not affect: (i) relations between the Bank and its borrowers and between states (whether members of the Bank or not); and (ii) the efficient utilization and protection of international waterways. The policy applies to the following types of projects: (a) Hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial and similar projects that involve the use or potential pollution of international waterways; and (b) Detailed design and engineering studies of projects under (a) above, include those carried out by the Bank as executing agency or in any other capacity.	This policy is triggered if (a) any river, canal, lake or similar body of water that forms a boundary between, or any river or body of surface water that flows through two or more states, whether Bank members or not; (b) any tributary or other body of surface water that is a component of any waterway described under (a); and (c) any bay, gulf strait, or channel bounded by two or more states, or if within one state recognized as a necessary channel of communication between the open sea and other states, and any river flowing into such waters.
OP 7.60 Projects in Disputed Areas	The objective of this policy is to ensure that projects in disputed areas are dealt with at the earliest possible stage: (a) so as not to affect relations between the Bank and its member countries; (b) so as not to affect relations between the borrower and neighboring countries; and (c) so as not to prejudice the position of either the Bank or the countries concerned.	This policy is triggered if the proposed project will be in a "disputed area". Questions to be answered include: Is the borrower involved in any disputes over an area with any of its neighbors. Is the project situated in a disputed area? Could any component financed or likely to be financed as part of the project be situated in a disputed area?
The WB Group Environment, Health and Safety Guidelines.	The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The guidelines include;- **Environment** • Air Emissions and Ambient Air Quality • Energy Conservation • Wastewater and Ambient Water Quality • Water Conservation • Hazardous Materials Management • Waste Management	These guidelines will be followed during the preparation of mitigation measures. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as

Policy	Objective	Trigger for the Policy
	• Noise • Contaminated Land • Occupational Health and Safety Guidelines • Community Health and Safety • Construction and Decommissioning	part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

5.1 World Bank's Safeguards Triggered by Project

The following safeguard policies have been triggered for the REP.

Table 6: Safeguard polices likely to be triggered under REP

Safeguard Policies Triggered by the Project(For the Moment)	Yes	Reasons For Triggers	No
Environmental Assessment (OP/BP 4.01)	X	Investments are likely to have potential moderate/low adverse environmental impacts	
Natural Habitats (OP/BP 4.04)	X	The SREP will not support any project that is anticipated to have any adverse impacts on critical natural habitats (forests, wetlands, mangroves, etc.) or environmentally sensitive areas. However, if there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the project will include mitigation measures acceptable to the Bank. Such mitigation measures will meet conditions under OP/BP 4.04 (Natural habitats) para 5-8.	
Pest Management (OP 4.09)		The project will not involve use of pesticides	X
Physical Cultural Resources (OP/BP 4.11)	X	The SREP triggers OP/BP 4.11 (Physical Cultural Resources), based on the assumption that implementation of mini grids could impact on physical cultural resources since mini grid construction projects will involve moderate/low/significant excavations, demolition, movement of earth. The EA that will be prepared for such projects will include a physical cultural resources management plan that includes (a) measures to avoid or mitigate adverse impacts on physical cultural resources; (b) provisions for managing chance finds; (c) any necessary measures for strengthening institutional capacity for the management of PCP; and (d) a monitoring system to track progress of these activities.	
Involuntary Resettlement (OP/BP 4.12)	X	Investments may involve land take	

		for construction purposes	
Indigenous Peoples (OP/BP 4.10)		Investments will not be in areas where IPs are located.	X
Forests (OP/BP 4.36)		The SREP will not finance any project which involves conservation or degradation of any forest area and any plantation activities.	X
Safety of Dams (OP/BP 4.37)		Investments will not involve dam construction	X
Projects in Disputed Areas (OP/BP 7.60)		Investments will not be in areas under dispute as per the Bank policy	X
Projects on International Waterways (OP/BP 7.50)		Investments will not affect international waterways	X

5.1.1 Environmental Assessment (OP4.01)

This policy requires Environmental Assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision-making. The EA is a process whose breadth, depth, and type of analysis will depend on the nature, scale, and potential environmental impact of the proposed investments under the REFP. The EA process takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property) and transboundary and global environmental aspects.

The adverse environmental and social impacts under the REFP will come from the proposed investments and associated activities. However, since the exact location of these investments will not be identified before bank appraisal of the project, the Banks' EA policy calls for the GoR to prepare an Environmental and Social Management Framework (ESMF) in accordance with its' procedures.

Consultation with relevant stakeholders is a key requirement of OP. 4.01 and for all sub project investment identified, as part of the EA process, consultation will be mandatory and record of the consultations documented.

OP 4.01 is triggered because the REFP may finance civil works activities related to the construction of renewable energy ventures (mini hydro and solar), as well as the disposal of solar batteries when obsolete. This ESMF establishes a mechanism to determine and assess future potential environmental and social impacts during implementation of REFP activities, and sets out mitigation, monitoring and institutional measures to be taken during operations of these activities, to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

In regard to disclosure of the ESMF report, World Bank requires that the report be disclosed as a separate document as a condition for Bank appraisal. This report will be disclosed to the general public to meet this requirement as well as the World Bank external website and the date of disclosure will precede the date for appraisal of the program. The World Bank system assigns a project to one of three project categories, as defined below:

The extent and type of environmental and social assessment required by the World Bank is a function of the project's environmental impact and hence, its environmental screening category. The World Bank undertakes environmental and social screening of each proposed subproject to determine the appropriate extent and type of environmental and social assessment. The World Bank classifies projects into one of three categories (A, B C and F1), depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

Table 7. World Bank EA Screening Categories

Category "A"	An EIA is always required for projects that are in this category. Impacts are expected to be 'adverse, sensitive, irreversible and diverse with attributes such as pollutant discharges large enough to cause degradation of air, water, or soil; large-scale physical disturbance of the site or surroundings; extraction, consumption or conversion of substantial amounts of forests and other natural resources; measurable modification of hydrological cycles; use of hazardous materials in more than incidental quantities; and involuntary displacement of people and other significant social disturbances.
Category B	When the subproject's adverse environmental impacts on human populations or environmentally important areas (including wetlands, forests, grasslands, and other natural habitats) are less adverse than those of Category A subprojects. Impacts are site – specific; few, if any, of the impacts are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A subprojects. The scope of environmental assessment for a Category B subproject may vary from sub-project to sub-project, but it is narrower than that of a Category A sub-project. It examines the subproject's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
Category C	If the subproject is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C sub-project.
Category F1	Project provides funds to a bank, credit institution, etc. for on-lending at FI's own risk (OP/BP 8.30 – FI lending). Sub-projects to be screened and categorized as A, B or C and handled accordingly

The project is rated as Category FI, however all identified sub projects will be screened and categorised as B, or C and handles accordingly. All sub projects in this REFP will be subjected to mandatory screening to determine whether they require further environmental analysis or otherwise.

5.1.2 Involuntary Resettlement (OP 4.12)

The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets, or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to project appraisal of proposed projects. The main objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; and (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; and (iv) provide assistance to affected people regardless of the legality of land tenure.

The policy requires the displaced persons and their communities, and any host communities receiving them, are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement; and appropriate and accessible grievance mechanisms are established for these groups. In new resettlement sites or host communities, infrastructure and public services are provided as necessary to improve, restore, or maintain accessibility and levels of service for the displaced persons and host communities.

A Resettlement Policy Framework has been prepared for the project principally because the envisaged investments may involve land acquisition and or restriction of access to existing infrastructure. The RPF will guide preparation of Resettlement Action Plans (RAPs), where required.

5.1.3 Natural Habitats (OP/BP 4.04)

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank2 therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats.

The SREP will not support any project that is anticipated to have any adverse impacts on critical natural habitats (forests, wetlands, mangroves, etc.) or environmentally sensitive areas. However, if there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the project will include mitigation measures acceptable to the Bank. Such mitigation measures will meet conditions under OP/BP 4.04 (Natural habitats) para 5-8.

5.1.4 Physical Cultural Resources (OP/BP 4.11)

This policy addresses physical cultural resources, 1 which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international

community. 2. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices.

The SREP triggers OP/BP 4.11 (Physical Cultural Resources), based on the assumption that implementation of mini grids could impact on physical cultural resources since mini grid construction projects will involve moderate/low/significant excavations, demolition, movement of earth. The EA that will be prepared for such projects will include a physical cultural resources management plan that includes (a) measures to avoid or mitigate adverse impacts on physical cultural resources; (b) provisions for managing chance finds; (c) any necessary measures for strengthening institutional capacity for the management of PCP; and (d) a monitoring system to track progress of these activities.

5.2 BRD's Social and Environmental Safeguards Policies

BRD's environmental objectives are to preserve, protect and improve the quality of the environment; protect human health, in relation to the environment; ensure the prudent and rational utilization of natural resources and to conserve nature; and, promote measures to deal with regional or worldwide environmental problems, notably climate change and access to potable water and sanitation.

BRD is implementing a robust social and environmental policy prepared in 2013 and an Environmental and Social Management System, which is compliant with Rwandan regulatory framework that pertains to the environment, land use, labor health and safety issues, vulnerable and marginalized groups and cultural artifacts. BRD is well equipped with professionals who over the years have received training in environmental and social risk management and therefore should be up to the task under the proposed Project. However, BRD may have to hire additional staff and dedicate them to the proposed Project. BRD will appoint Social Safeguards and Environmental Safeguards officers who will be responsible for supervising the implementation of safeguards instruments and ensure that activities comply with ESMF/RPF and, if necessary, an Environmental Management Plan/Resettlement Action Plan are developed as appropriate.

In order to implement the terms of this social and environmental policy, BRD has developed a Social and Environmental Management System (SEMS). The purpose of the SEMS is to proactively identify and evaluate the social and environmental risks of projects before a decision is made to finance them and to monitor ongoing social and environmental performance after disbursement. BRD recognizes that the SEMS will periodically have to be reviewed and revised to reflect changes in the regulatory framework as well as best practice guidelines, and to better suit the needs of its mission and clients. The procedures of the SEMS are integrated with BRD's existing financial risk management procedure, and as a result, BRD will ensure that all activities considered for financing will be subject to:

- Screening against a list of excluded activities, which BRD will not finance;
- Identification of social and environmental risks during project appraisal;
- Social and environmental due diligence, including compliance with applicable

national laws, and the applicable requirements of external stakeholders commensurate with the level of risk and type of project, and proposed corrective actions to mitigate potential social and environmental impacts;

- Monitoring and reporting on the social, environmental and financial performance of projects after disbursement; and,
- Continuous improvement in the social and environmental performance of projects financed by BRD.

For effective implementation of the SEMS and to ensure that the risk review process is conducted in an efficient and timely manner, BRD has developed guidelines to help relevant staff (staff and senior management) improve their ability to identify social and environmental issues and assess risks. BRD also ensures that staff has the necessary resources to perform their duties under the SEMS and receive training, as necessary. To ensure compliance with the SEMS, BRD hires consultants, as deemed necessary, to make site visits and conduct social and environmental due diligence.

5.3 Environmental and Social Lending Guidelines

BRD has guidelines that apply to its Bank's activities in general and lending activities in particular. The guidelines are applicable to:

- Environmental risks
- Social risks (including labor, and regulatory issue as associated with the employment)
- Corporate Social Responsibilities

5.4 Alignment of WB and GOR Polices relevant to this ESMF

Both the World Bank safeguards policies and GoR laws are generally aligned in principle and objective:

- Both require screening of sub project investments in order to determine if further environmental analysis (ESIAs) is needed.
- Both require ESIA before project design and implementation (which also includes an assessment of social impacts).
- Both require public disclosure of ESIA reports.
- The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project which is equivalent to the Organic Law on Environment requirements in Rwanda.
- Additionally, statutory annual environmental audits are required by the Organic Law on Environment.

5.5 Requirements for Public Disclosure

Prior to appraisal of the REP, this draft ESMF will be disclosed in country through posting on BRD (www.brd.rw) as well as in the Bank's external website. If there are any changes, a final version will be disclosed in the same manner and places described later.

6 DETERMINATION OF POTENTIAL ENVIRONMENT AND SOCIAL IMPACTS

This chapter analyses the potential positive (beneficial) and negative (adverse) environmental consequences of the sub project investments envisioned under the Rwanda Renewable Energy Fund Project.

6.1 Positive Impacts

Increased access, reliability, and cost of energy services are among the project impacts. The final project beneficiaries are Rwandan households and businesses which will gain access to off-grid electricity services through solar systems or mini-grids and whose use of electricity will replace consumption of diesel, kerosene, and dry cell batteries as well as other alternative fuels. The direct project beneficiaries include (i) participating SACCOs and commercial banks, which will gain knowledge and experience in lending in a new sector; (ii) mini-grid developers who will gain access to finance to build mini-grids; and (iii) private companies engaged in off-grid electrification (mini-grid developers and potentially locally-registered off-grid solar companies), which will get access to financing for expanding their businesses in Rwanda as well as gain experience of working with local financial institutions. The Development Bank of Rwanda (BRD) will also benefit from capacity building in energy lending. The project will facilitate the deployment of about 350,000 off-grid connections and benefit over 1,000,000 people, 52 percent of whom are women.

The project will deliver positive environmental impacts since off-grid solar systems and mini-grids would replace lighting systems that are either fossil fuel-based such as diesel generators and kerosene lamps or woody biomass, or non-reusable dry-cell batteries, which are detrimental to the biophysical environment. The project will install solar PV systems on rooftops or mount them on poles. Lamps and other ancillary equipment will be deployed directly in homes without any construction. There will be no greenhouse gases (GHGs) or air pollutants emitted into the atmosphere during installation and operation of solar PV systems.

6.2 Potential Adverse Impacts

This project is not likely to have significant impacts on the environment and more specifically the solar infrastructure which will have no impact other than the disposal of the obsolete batteries. However, the construction of mini-grids may lead to adverse environmental and social impacts. The adverse impacts associated with the project are considered to be moderate to low in nature. However, the specific adverse impacts for each investment will be distinguished during the preparation of the specific ESIA or ESMP based on the sub project investment environmental category once the screening process is complete.

6.3 Adverse Environmental Impacts

6.3.1 Loss of vegetation

There will be vegetation loss (site specific) during the construction phase for mini grids either to pave way for actual project construction among others. The vegetation will be cleared so that the area where the construction work is to take place is clear for the construction work to be performed. The construction works may also involve direct land take of productive pasture land and agricultural lands, bush clearing, removal of top soil, excavation and mass haulage. These activities will expose the land to elements of erosion such as wind and water and thus will trigger the process of land degradation.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with clearing of vegetation.

6.3.2 Decreased Air Quality

Airborne dust will be caused by excavation, vehicle movement hence engine combustion and materials handling, particularly downwind from the construction sites during the construction phase of the identified investments. Uncovered stock piles and asphalt mixing plant operations are another source of dust. Air pollution will be further caused by emissions from vehicles and construction machinery. There will be decreased air quality due to dust, suspended particles, hydrocarbon vapours, oxides of nitrogen and sulphur (NOx and SOx) and Volatile Organic Compounds (VOC) among other emissions.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with air quality.

6.3.3 Water Quality Degradation

The project civil works are likely to alter the water quality in the local water mainly due to site clearing and the disruption of the natural drainage patterns. The construction phase of the mini grids may lead to increased water turbidity within the riverine ecosystem and downstream. There will also be potential water contamination from hydrocarbons mainly from the contractor's machineries.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with water quality degradation.

6.3.4 Hydrology Impacts

Construction activities may manifest in impacts to the local hydrology. Mini grid construction may interrupt the river system resulting to direct consequence of change in the river flow patterns, sediment transport as well as change in the river discharge pattern downstream of the dam. Change in the river hydrology may consequently also have an effect on the aquatic habitat such as an impact of fish breeding and migration hence habitat loss.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with hydrology.

6.3.5 Sedimentation

The construction of mini grids shall involve earth moving within the river flood plains and sections of the adjoining riverbanks and lands. This loosening of the soil and the steep slope terrain will create a situation where any heavy rains will freely wash down the silt into the downstream areas. The silt when washed down may contain high levels of organic matter and deposition of this may lead to anoxic conditions in the lower water levels with potential risks to the associated aquatic life.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with sedimentation.

6.3.6 Noise and Vibration Impacts

Construction activities of the mini grids could result in noise impacts so as to impact on general well-being, health and functioning. Infrastructure developments related to the mini grids may involve the use of construction equipment (graders, drilling equipment, trucks, tractors and excavators) for among others blasting, excavation, asphalt mixing plant operations and vehicular movement that emit noise usually harmful to the environment.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with noise and vibration.

6.3.7 Road Safety, Traffic Management and Access

Traffic congestion from construction phases of mini grids could potentially cause disruption, health and safety impacts, as well as economic impacts. The use of heavy moving construction vehicles and machineries in project sites is generally known to cause traffic reducing movement and flow of vehicles and sometimes road accidents are associated with construction sites. Public access is likely to be compromised and restricted during construction activities.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to impacts associated with traffic or access denial.

6.3.8 Construction Solid and Effluent Waste

Solid waste issue is a potential adverse impact that will be as a result of abandonment of litter/construction materials on site. Solid waste from solar installation will be limited and insignificant during installation phase. Construction activities related to mini grids may however generate solid wastes that may adversely affect the environment including construction debris among others.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to significant impacts associated with waste construction waste generation.

6.3.9 Obsolete Solar Batteries Waste

The main environmental, health and safety concerns are likely to be associated with recycle and disposal of spent batteries at the end of their useful lives, which is usually three to five years after deployment. Rechargeable batteries for storing solar energy may run on nickel-cadmium (Ni-Cad), nickel metal hydride (NiMH), lithium-ion (Li-ion), lead-acid (Pb-A), or lead-gel (Pb-gel). These batteries should not be disposed in standard landfills because they can create long lasting environmental and human health impacts (e.g., headaches, abdominal discomfort, seizures and comas, cancers, irritation of skin and respiratory system, burns and damage to skin and eyes, corrosion, etc.) due largely to the heavy metals such as mercury, lead, cadmium and nickel, and acids. The entire management processes including de-manufacturing, collection, storage, recycling, transport and disposal may present a challenge to this project, given the scope of this Bank operation.

Mini grids sub projects during operation phase (transmission) may generate hazardous wastes especially from the transformers if they will be oil based (transformer oil).

6.3.10 Visual Intrusion

Unsightly earthworks and borrow pits during construction may be a source of visual related impacts especially through scarring of landscapes. Construction activities related to hydro mini grids may have visual related impacts. Similarly, the establishment of solar panels on roof tops may contribute to visual intrusion

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage.

6.3.11 Downstream Impacts

Changes to the low flow regime may have significant negative impacts on downstream users. Minimum demands from both existing and potential future users need to be clearly identified and assessed in relation to current and future low flows. The quality of low flows is also important. A reduction in the natural river flow together with a discharge of lower quality drainage water can have severe negative impacts on downstream users.

Habitats both within and alongside rivers are particularly rich, often supporting a high diversity of species. Large changes to low flows (±20%) will alter micro-habitats of which wetlands are a special case. It is particularly important to identify any endangered species and determine the impact of any changes on their survival. Such species are often endangered because of their restrictive ecological requirements. The ecology of estuaries is sensitive to the salinity of the water which may be determined by the low flows. Saline intrusion into the estuary will also affect drinking water supplies and fish catches. It may also create breeding places for anopheline vectors of malaria that breed in brackish water.

As a result, in the cumulative impact analysis which would be done for each investment the impact of a given project on those people should be considered. The most important mitigation measures are the release of good quality Reserve Flows capable of maintaining important environmental services, and satisfying downstream water requirements.

6.3.12 Borrow Pits and Quarry Sites

Borrow pits and quarry are sites where stone, sand, gravel, till, clay, or other granular soils are extracted for construction of the hydro-mini-grids. Environmental impacts of pit and quarry development can include the loss, reduction or disturbance to wildlife and habitat, erosion, dust, soil/groundwater contamination, damage to historic resources, waste disposal, noise, and aesthetics.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to significant impacts associated with waste construction waste generation.

6.4 Social Impacts

6.4.1 Public Health

There is a potential risk (minimal) that the construction process for most of the investment projects could increase HIV/AIDS and other STI prevalence in the project areas especially through interactions of the locals with the labour forces. Increase in risk of sexually transmitted diseases, such as HIV/AIDS etc. due to influx of migrant workers; solid waste and effluent discharge from construction camps; risk of increase in vectors of *schistosomiasis, river blindness, Lymphatic filariasis (elephantiasis)* and malaria due to stagnant water associated with construction works/borrow pits etc.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to significant impacts associated with waste construction waste generation.

6.4.2 Loss of Land

Construction of mini grids is likely to lead to economic and physical displacement of communities in sites identified for the investments. There will be loss of farm land, grazing land, business and structures among others by the local communities owning the land mainly during construction of hybrid mini grid infrastructure. The construction activities will involve a relatively low degree of land take bearing in mind that most of the projects are linear in nature thus requiring adequate land and space.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to significant impacts associated with waste construction waste generation.

6.4.3 Health and Safety of Construction Workers and Community

Occupation health and safety of the workers during the construction phase is likely to be a concern due to the accidents that normally occur in construction sites that could cause loss of life, limbs among others. Construction activities may also endanger the health and

safety of the local community around the construction sites as a result of construction related hazards. The construction of mini grid facilities (including generation, transmission and distribution) are likely to lead to occupational safety and health impacts. Communities near generation and transmission facilities remain at risk with respect to safety. The installation of solar panels may have minimal or no impacts on occupational safety and health.

6.4.4 Workers Influx Impacts

Construction activities related to hybrid mini grids may lead to influx of workers but the scale is likely to be very low including significance.

The influx of workers and followers can lead to adverse social and environmental impacts on local communities, especially if the communities are rural, remote or small. Such adverse impacts may include increased demand and competition for local social and health services, as well as for goods and services, which can lead to price hikes and crowding out of local consumers, increased volume of traffic and higher risk of accidents, increased demands on the ecosystem and natural resources, social conflicts within and between communities, increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime. Such adverse impacts are usually amplified by local-level low capacity to manage and absorb the incoming labor force, and specifically when civil works are carried out in, or near, vulnerable communities and in other high-risk situations.

The increase in the number of people in a specific project area or site especially during construction has the potential to lead to a number of negative socio-economic impacts, including increased insecurity and community conflicts, increased incidences of diseases; increased risk of accidents and occupational hazards; and immigration of construction workers and labour force management challenges.

This impact will be associated with activities related to construction of mini grids (generation stage) as well as transmission stage. Solar power projects will not lead to significant impacts associated with labor influx.

6.5 POTENTIAL CUMULATIVE IMPACTS

6.5.1 Stock piling of obsolete batteries

The main cumulative environmental, health and safety concerns are likely to be associated with recycle and disposal of spent batteries at the end of their useful lives, which is usually 3-5 years after deployment. Rechargeable batteries for storing solar energy may run on nickel-cadmium (Ni-Cad), nickel metal hydride (NiMH), lithium-ion (Li-ion), lead-acid (Pb-A) or lead-gel (Pb-gel). These batteries should not be disposed in standard landfills because they can create long lasting environmental and human health impacts (e.g., headaches, abdominal discomfort, seizures and comas, cancers, irritation of skin and respiratory system, burns and damage to skin and eyes, corrosion, etc.) due largely to the heavy metals such as mercury, lead, cadmium and nickel, and acids. The entire management processes including de-manufacturing, collection, storage, recycling,

transport and disposal may present a challenge to this project, given the scope of this Bank operation.

6.5.2 *Hydro Mini grids*

Hydro mini-grid investment projects may individually have insignificant adverse environmental impacts. However, several water investments in combination, or in combination with other government or private sector activities within the water sector, could have a larger, more significant cumulative impact.

6.6 Environmental and Social Management Process

This ESMF contains potential mitigation measures and monitoring indicators (***see tables 6 and 7***) through which the adverse impacts for specific sub project investments may be managed. However, each sub project will have to prepare an ESMP. The ESMP for each sub project should at a very minimum contains among others;-

- Description of the possible adverse effects that the ESMP is intended to address;
- Identification of project design alternatives that would meet similar objectives, and a description of why these projects are not viable, especially if they have a lesser environmental or social impact;
- Description of planned mitigation measures, and how and when they will be implemented
- Program for monitoring the environmental and social impacts of the project, both positive and negative;
- Description of who will be responsible for implementing the ESMP; and
- Cost estimate and source of funds.

6.6.1 *Mitigation considerations and options*

All moderate to major adverse impacts are considered for mitigation. Specific measures have been suggested in this regard where practicable. With regard to negligible and minor impacts where the project activity is not expected to cause any significant impact in such cases, best practice measures and mitigation have also been recommended where appropriate to improve the environmental and social performance of the Project. The mitigation options considered may include project modification, provision of alternatives, project timing, pollution control, compensations and relocation assistance. In cases where the effectiveness of the mitigation is uncertain, monitoring programs are introduced.

6.6.2 *Recommended mitigation measures*

The mitigation measures or guidelines have been designed in order to avoid, minimize and reduce negative environmental and social impacts at the project level. The mitigation measures are presented in the following tables in a descriptive format.

Table 6: Proposed mitigation measures

Impacts	Description of mitigation measures
Physical Environment	
Solid and Effluent Waste	Solid nontoxic waste Adequate waste receptacles and facilities should be provided at project sites/camp sites

	Training and awareness on Safe Waste Disposal in construction camps for all workers Final disposal should be at dumpsites approved by the REMA <u>Waste oil /fuel</u> Spent or waste oil from vehicles and equipment should be collected and temporarily stored in drums or containers at site Waste oil should be disposed of by oil marketing companies or agents approved or recognized and have the capacity to undertake oil disposal Prepare Waste Disposal Plan for every construction site Install waste disposal receptacles and signs in strategic places within the construction camps Provide training and awareness on need to avoid littering Ensure the construction camps have toilets and connected to the sewer system **<u>Spent Battery Waste</u>** Ensure that all spent/obsolete batteries from the solar panels are recycled
Decreased Air Quality	Proposed investments should require that construction contractors operate only well maintained engines, vehicles, trucks and equipment. A routine maintenance program for all equipment, vehicles, trucks and power generating engines should be in place. The project should ensure the use of good quality fuel and lubricants only If dust generation at the project/construction site becomes a problem, limited wetting of sites and or unloading and reloading points should be done to reduce dust raising Construction traffic speed control measures should be enforced on unpaved roads (speed limits through communities should be ≤50km/hr on unpaved roads and near or at project site should be ≤30 km/hr). Engines of vehicles/trucks and earth-moving equipment should be switched off when not in use.
Noise and vibration	Proposed investments should require contractors to use equipment and vehicles that are in good working order, well maintained, and that have some noise suppression equipment (e.g. mufflers, noise baffles) intact and in working order. This will be achieved by making it a component of contractual agreements with the construction contractors. Contractors will be required to implement best driving practices when approaching and leaving the site (speed limit of ≤30 km/hr) to minimize noise generation created through activities such as unnecessary acceleration and breaking squeal. Engines of vehicles/trucks and earth-moving equipment should be switched off when not in use.
Visual Impacts	Landscaping of facilities after construction and restoration of disturbed areas e.g. borrow pits
Impact on traffic and public safety	Only road worthy vehicles and trucks should be used to avoid frequent breakdowns on the roads Only experienced drivers should be employed Contractors must provide training for drivers; Establish speed limits; Enforce

	safe driving and take disciplinary action against repeat offenders
Water Abstraction	Obtain water abstraction permits from the Water Resources Management Authority
Decreased Water Quality	No garbage/refuse, oily wastes, fuels/waste oils should be discharged into drains or onto site grounds Fuel storage tanks/sites should be properly secured to contain any spillage Maintenance and cleaning of vehicles, trucks and equipment should take place offsite especially where project sites are close to water bodies. Toilet facilities should be provided for construction workers to avoid indiscriminate defecation in nearby bush or local water bodies
Soil Erosion	Minimize land clearing areas as much as possible to avoid unnecessary exposure of bare ground to the elements of the weather Re-vegetate cleared areas as early as possible using native plant species As much as possible, avoid construction work in the rainy season
Impact on fauna and habitat	Avoid unnecessary exposure and access to sensitive habitat areas For identified or suspected sensitive habitats (swamps/ wetlands), regular inspection or monitoring should be carried out in the area prior to start and during work. If sensitive habitats are encountered, Project activities should cease and the Project should consult wildlife agency to determine the appropriate course of action. If the project site is discovered as a sensitive habitat area, the Project should engage the wildlife agency to develop a suitable plan. Prohibition on hunting and consumption of bush meat by workforces Proposed investments should require that contractors implement a hazardous materials management plan that includes specification for proper storage and handling of fuels, oil, wastes, and other potentially hazardous materials as well as a plan for containment and clean-up of accidental spills into the aquatic environment. During pre-installation and installation of project facilities, spotting of sensitive aquatic mammals should form part of the project activities. Should these species be observed in the vicinity of the work area, the project should execute measures to avoid destruction or disturbance. Ensure provision for water flow reserves and appropriate reservoir filling schedules Project staff must report sightings of any injured or dead aquatic life (fishes)/ mammals immediately, regardless of whether the injury or death is caused by a Project activity. The report should include the date and location of the animal/strike, and the species identification or a description of the animal. The report should be made to the wildlife agency in Rwanda. The Project workforce and local communities should be educated to ensure that the importance of environmental protection and nature conservation are effectively communicated and that wider appreciation of environmental issues and construction best practice are fostered.
Downstream Impacts	Maintain environmental flow reserves for the river, Do into retain water in reservoir during drought, ensure that water retention in dam is controlled to

	ensure that adequate reserve is left to flow downstream for users
Quarry Site Impacts	Identify borrow and quarry sites away from sensitive environments and develop quarry management and rehabilitation plans
Hydrology Impacts/Changes	Maintain environmental flow reserves for the river, Do into retain water in reservoir during drought, ensure that water retention in dam is controlled to ensure that adequate reserve is left to flow downstream for users
Social Environment	
Physical displacement	All affected persons to be given relocation assistance (cash or kind) by the Project to enable them move their properties to new locations, i.e. in accordance with the Resettlement Policy Framework (RPF) Resettlement Plans will be required. If a site is acquired, the State may relocate persons and their families as well as community facilities to be affected. The affected families should not be made to incur any cost during the relocation period. A resettlement plan should be prepared for this area with the RPF as a guide.
Loss of employment and livelihoods	Those whose livelihood is affected should be assisted to ensure they will not be worse off as a result of the project. This can include livelihood assistance, provision of new jobs immediately without any loss of income. The social assessments and socio-economic surveys, which will be undertaken for the preparation of individual investments/subprojects as well as the resettlement action plans, should assess these issues and provide measures in accordance with the Resettlement Policy Framework (RPF). Contractors should use local labor as much as possible and where available. As much as possible, all unskilled labor should be contracted or obtained from the local community.
Loss of land and other assets	Due process should be followed to establish the true owner of any land, be it family or communal land. Once established, the project should acquire the site by paying appropriate compensation in accordance with the resettlement policy framework (RPF), which would be the replacement cost of the assets lost.
Loss of structures/properties	For a project site to be used, irrespective of the land ownership, appropriate compensation should be paid for any structures/ properties which are permanent structures at the site as well as investment made for any development on the land. Depreciation should not be factored during valuation of these properties. The compensation process should satisfy the RPF developed for the project. Appropriate compensation should be paid for any damaged or destroyed propriety that belongs to affected persons. No depreciation during valuation of these properties.
Impact on access among communities living in the project areas	Measures will be considered in the projects' design to ensure that communities are not divided and if they are as a result of a project appropriate measures are taken to mitigate this impact.
Impacts on recreation and public areas	Appropriate notices and warning signs will be erected around working areas and public areas to warn prospective trespassers of any danger or risk
Impacts on human health/ traffic safety and sanitation	Trucks carrying construction materials such as sand, quarry dust, laterite etc. will have the buckets covered with tarpaulin or appropriate polythene material from or to project site Only road worthy vehicles/trucks should be used Only experienced drivers/operators should be employed Except for areas secured by fencing, all active construction areas will be marked with high-visibility tape to reduce the risk accidents involving pedestrians and vehicles. All open trenches and excavated areas will be backfilled as soon as possible

	after construction has been completed. Access to open trenches and excavated areas will be secured to prevent pedestrians or vehicles from falling in. Adequate sanitary facilities will be available for workers and open range defecation will not be countenanced. Construction workers will be provided with and educated to wear suitable Personal Protective Equipment (PPE) including hard hats, overalls, high-visibility vests, safety boots, earplugs, gloves etc. Enforce use of PPEs at all times for all staff and labourers and ensure supervision of the same to minimise accidents Construction workers should be educated to adhere to basic rules with regard to protection of public health, including most importantly hygiene and disease (HIV/AIDS) prevention.
Impacts on cultural heritage / archaeological interest / existing ecologically sensitive areas	The pre-construction surveys should identify cultural heritage resources and existing ecologically sensitive areas that the project should avoid and by-pass these resources. The Project should implement a chance find procedure and reporting system to be used by contractors in the event that a cultural heritage feature or ecologically sensitive item/issue is encountered.
Impacts on human health and public safety	The Project will require all contractors to implement an Environmental, Health and Safety (EHS) plan which will outline procedures for avoiding health and safety incidents and for emergency medical treatment. This will be achieved by making it a component of contractual agreement. Contractors will be required to wear suitable Personal Protective Equipment (PPE) including hard hats, high-visibility vests, safety boots and gloves and life vests as appropriate in accordance with the EHS plan. Enforce use of PPEs at all times for all staff and labourers and ensure supervision of the same to minimise accidents All construction and other workers will be sufficiently trained in the safe methods pertaining to their area of work to avoid injuries.
Labor Influx Management	Develop site-specific measures before the contractor starts work, and update them as necessary to reflect project developments. Overall, adequate monitoring and adaptive management of the potential impacts from labor influx are key to properly addressing them and mitigating risks. Recruit as many local workers from the areas as possible. Provide training for the local communities to acquire skills needed for work opportunities if there is reasonable time especially on monitoring and maintenance. Develop a Labour Influx Management Plan and Workers Camp Management Plan for all projects. Outline the contractors responsibilities on influx management in contracts.
Impact on gender access to water for household use and household plots as well as impact on pastoralists and fisheries.	The project will take into consideration the different needs for water and types of access which will be affected for each of these groups and provide relevant mitigation measures which will be decided with those affected. Some mitigation measures could include water points for household use and livestock; livelihood assistance to those whose whole or partial livelihood will be affected as a result of some of the possible investments such as dams. Specific impact and relevant measures will be covered by project specific social assessment.
HIV/AIDS Spread and other related public health diseases – Water borne diseases etc.	Design HIV/AIDS awareness, sensitisation and prevention program for each project that extends to the communities as a whole; Design programs for reducing the spread of water borne diseases like Malaria, Bilharzia etc. in collaboration with the Ministry of Health
Labour and employment related	Ensure that the local communities are given priority in relation to employment

impacts	and provided with training (skilled) to provide future labour in the project e.g. operation and maintenance. Ensure that workers are provided satisfactory working conditions and work environment including pay in accordance with the laws of the country Ensure that child labour is not tolerated in the project; The project to prepare redundancy plans and packages to be discussed with affected workers which will include re- training and re- tooling of affected workers and aim to avoid labor strife

6.7 Monitoring Plans and Indicators

6.7.1 Monitoring of Environmental and Social Indicators

The goal of monitoring is to measure the success rate of the project, determine whether interventions have resulted in dealing with negative impacts, whether further interventions are needed or monitoring is to be extended in some areas. Monitoring indicators will be very much dependent on specific project contexts.

Monitoring Levels-Overall Project Level

Whereas the sub-projects safeguard instrument (RAPs, ESMP) will be prepared and implemented by fund beneficiaries, BRD will be responsible for appraising and approving sub-projects, organizing the management and implementation of sub-projects, and supervising the implementation of sub-projects, including the implementation of safeguards activities.

BRD will be responsible for overall monitoring and reporting on compliance with the ESMF. BRD will ensure that sub projects investments are screened, their safeguard instruments prepared, cleared and disclosed prior to sub project approval. Further, BRD will ensure that hydro **mini-grid developers** implement or cause their contractors to implement the specific sub project ESMP, and submit reports on ESMP implementation as required.

Within BRD, monitoring and surveillance of all the sub project investments will be undertaken by the Environmental and Social Safeguards Unit that exists within the Bank. The BRD will report results of this monitoring to the Bank.

Bank's Monitoring Support

The Bank will provide the second line of monitoring compliance and commitments made in the ESMP through supervision albeit in a less frequent manner and detail as compared to the first line of monitoring that will be undertaken by the specific implementing agencies. The bank will further undertake monitoring during its scheduled project supervision missions.

Specifically, for each year that the agreement is in effect, BRD will prepare monitoring reports and will consolidate and summarise these reports and submit to the Bank as part of its reporting to the Bank and the Bank supervision missions will review these reports and provide feedback.

Sub Project Level Monitoring

The second level of monitoring will be at the sub project level where the safeguard instruments for the investments will and must include a monitoring plan for which the BRD will be responsible for ensuring that monitoring is carried out. All sub project investments will be subject to mandatory annual environmental audit /supervision to ensure that they comply with the Organic Law.

Table 7: Monitoring indicator

Monitoring Level	Monitoring Issue	Verifiable Indicators	Responsibility
ESMF Level	Adequate dissemination of ESMF and RPF to stakeholders Capacity building and training programs	Record of consultations and meetings; Workshop reports	BRD
Project Investment Level	Preparation of environmental and social impact assessment report Environmental permitting Monitoring and evaluation	Independent consultants hired to prepare ESIA and/ RAP documents Environmental Permits for sub projects Environmental Management Plans, Monitoring Reports, Annual Environmental Reports	BRD

Table 8: Project monitoring indicators and responsibilities

Impact issue	Proposed Action/ Measures	Implementation tool/criteria	Monitoring indicators (Inputs)	Monitoring Indicators (Outcomes)	Verification	Project stage	Responsibility
Solid waste disposal	Provide adequate waste reception facilities at construction camp sites Dispose of waste at approved waste collection sites	Waste management plan/Construction site management plan	Number of waste bins at site bins Availability of waste disposal plan Final disposal records	Percentage of workers who follow the solid waste disposal plan including use of receptacles Number of workers familiar and aware of the waste disposal plan at the construction sites	Weekly checks by project engineer	Construction Operation	Contactor Project engineer
Waste oil/fuel disposal	Provide drums/containers for temporary storage on site of waste oil from equipment and vehicles. Dispose of waste oil through an approved agent	Waste management plan/Construction site management plan	Waste oil drums/containers on site Availability of waste disposal plan (waste oil)	Number of workers familiar and aware of the waste disposal plan Percentage of workers who follow the waste disposal plan including use of receptacles	Monthly checks by project engineer	Construction Operation	Contactor Project engineer

Air pollution	Purchase sound equipment/machinery for project Operate well maintained vehicles, trucks and other equipment Use good quality fuel and lubricants Suppress dust generation at project sites Switch off engines when not in use	Part of contract agreement Routine maintenance plan for machinery Purchase of fuel at recognized stations Schedule of works is to limit Water surfaces several times a day to reduce dust at the site.	Number of sound machinery and equipment purchased Availability of equipment and machinery maintenance plan Frequency of watering of surfaces to reduce dust related impacts	Percentage of workers following the good practices for equipment and machinery maintenance	Independent check by project engineers Verification of maintenance record by project engineers Self-check by contractor	Construction	Contactor/Project engineer
Noise pollution	Schedule of works is to be limited to daylight hours Compliance with the noise emission levels/standard Provision of PPE for workers for noise pollution Train workers on the use of PPEs for noise mitigation and reprimand those not complying	Part of contract agreement for the contractors	Recorded grievances Number of PPE procured for noise mitigation	Number of workers correctly and frequently using PPEs Number of workers aware of the emissions standards of REMA and complying with the same	Self-check by contractor	Construction	Contactor/Project engineer
Impacts on landscape	Landscaping of facilities after construction, and restoration of disturbed areas	Construction site maintenance and restoration plan.	Implementation of the plan	Quality of restored landscapes Number of disturbed sites successfully restored	Self-check by contractor	Construction	Contactor/Project engineer

Traffic impacts	Use only road worthy vehicles and trucks Use experienced drivers Contractors must provide driver training Establish speed limits, Enforce safe driving and take disciplinary action against repeat offenders.	Purchase sound vehicles and trucks /machinery for project Driver qualification recorded Traffic Safety Plan	Traffic incidence records Grievances Recorded	Number of drivers aware and familiar with the traffic safety plan Percentage of drivers who have not committed a traffic offence for the last 6 months Number of compliance (traffic) inspection and checks conducted by traffic department found to be satisfactory	Project engineers to verify	Construction	Contactor/Project engineer

Water pollution	No garbage/refuse, oily wastes, fuels/waste oils should be discharged into drains or water bodies Fuel storage tanks/sites should be properly secured Maintenance and cleaning of vehicles, trucks and equipment should take place offsite. Provide toilet facilities for construction workers Construction activities, including camps to include measures to control runoff	Waste management plan Spill prevention and control plan Water Quality Plan to measure the quality of water including physical, chemical and biological. Implement an Integrated Pest Management Plan when using fertilizers and pesticides	Visibility of oil on water bodies Procurement and installation of water monitoring and measuring gauges On site erosion observed Proposed actions implemented Quality of water following periodic measurements No of pollution incidences recorded Number of complaints on pollution of water	Increased water quality upstream and downstream shown by periodic measurements Water samples collected showing compliance to water pollution standards	Daily self-checks by contractors Periodic reports on performance by contractor to project engineers Spot checks/audits by project engineers	Construction Operation	Contractors /Project engineers Project engineers

Impact on fauna and flora	Avoid unnecessary exposure or access to sensitive habitat. Avoid protected areas, critical habitats or areas with significant biodiversity (wetlands) Regular inspection or monitoring should be carried out in sensitive areas e.g. swamps/ wetlands the area prior to start of work. Ensure proper storage and handling of potentially hazardous materials (including oil).	If a sensitive habitat is discovered in the work area or vicinity, Project activities should cease. The contractor should notify project engineers who will consult wildlife agency to determine the appropriate course of action. Hazardous material management plan/accident management plan. Awareness raising among contractor personnel	Wildlife incidents recorded and reported	Number or percentage of terrestrial flora and fauna unaffected by the sub projects Number of workers aware and sensitized on the need to conserve the flora and fauna Impact on terrestrial flora and fauna	Regular self-checks by contractor Spot checks and audit by contractor to the client	Construction Operation Maintenance	Contractors /Project engineers/

Table 9: Project monitoring indicators and Responsibilities-Social Impacts

Impact issue	Proposed Action/ Measures	Implementation tool/criteria	Monitoring indicators (Input)	Monitoring indicators (Output)	Verification	Project stage	Responsibility
Impacts on downstream water users	Maintain Environmental Flows for river basins Ensure that abstraction of water complies with the water abstraction permits	Environmental Flows Plan	Presence of an Environmental Flows Plan calculated and approved by water abstraction agency Installation of Water Monitoring Stations Procurement of water measuring and monitoring equipment Availability of Water Abstraction Permit from Water regulation agency	Impacts on water uses and livelihoods downstream	Regular spot checks by water regulation agency Periodic checks of the flows by environmental team	Construction Operation	Contractor BRD REMA Water regulation agency
Impacts on recreation and public areas	Place notices and warning signs at working areas	ESMP	Grievance records	Recreational Facilities and areas restored/protected	Warning signs/notices in place	Construction	Contractors/Project engineers

Impacts on Human Health/ Safety and sanitation	Cover buckets of trucks carrying construction materials such as sand, quarry dust, etc. Use road worthy vehicles/trucks and experienced drivers/operators Active construction areas to be marked with high-visibility tape Backfill and or secure open trenches and excavated areas. Provide adequate sanitary facilities Provide PPEs for construction workers. Educate construction workers on site rules/regulation and hygiene and disease (HIV/AIDS) prevention.	ESMP Vehicle maintenance programme/plan in place Construction site management plan ESMP ESMP ESMP ESMP	Health and safety incident register Grievance records	Reduced accidents and hazards in construction sites Reduced incidence of diseases spread e.g. HIV/AIDS, and other STDs Increased understanding of workers on measures to reduce STDs/HIV/AIDS etc.	Health and safety plan under implementation Daily self-checks and verification by contractor Spot checks by project engineers Periodic reports by contractor to project engineers	Construction	Contractors
Impacts on cultural heritage/ archaeological interest /existing aquatic infrastructure and services	Identify cultural heritage resources and existing ecologically sensitive areas.	Pre-construction surveys / Chance Finds procedure Plan for accidental Cultural Finds	Cultural/ archaeological resources/ existing infrastructure encounter incidence register	Number of workers familiar with the chance find procedures	Chance finds procedure under implementation Daily self-checks and verification by contractor Periodic reports by contractor to project engineers	Preconstruction and construction and repairs/ recovery	Contractors
Impacts on Human Health and Safety	Use suitable Personal Protective Equipment (PPE). Provide Training on use of PPE	ESMP	Health and safety incident register Grievance records	Reduction in or increase in accidents due to use of or lack of use of PPEs	ESMP under implementation Spot checks and observations by project engineers Periodic reports on performance by contractor to project engineers	Pre-construction and construction, and repairs/ recovery	Contractors

Labour related impacts (Employment)	Ensure that the local communities are given priority in relation to employment and provided with training (skilled) to provide future labour in the project e.g. operation and maintenance	Human Resource Management Plan	Number of local residents employed in sub projects	Number of local residents employed in sub projects	Employment Records	Pre-construction and construction, and repairs/ recovery	Contractors/EA

6.8 Issues Related to Resettlement

The REFP triggers one other safeguard policy and therefore requires preparation of other safeguard instruments alongside this ESMF which have been prepared already. This is the Resettlement Policy Framework.

6.8.1 Resettlement Action Plan

Resettlement Action Plans (RAPs) will be needed for investment that may result in the loss of access to resources. The RPF outlines the relevant steps required in order to ensure that appropriate measures are put in place to safeguard the rights of affected persons and communities.

6.9 Monitoring Roles and Responsibilities

6.9.1 Development Bank of Rwanda (BRD)

BRD will be solely responsible for the environmental and social monitoring of the activities that they will provide funds/loans. BRD will be required to prepare periodic (monthly, quarterly and annual) monitoring reports for all sub projects subjected to further environmental analysis for submission to the World Bank and REMA.

BRD will be responsible for appraising and approving sub-projects, organizing the management and implementation of sub-projects, and supervising the implementation of sub-projects, including the implementation of safeguards activities.

6.9.2 Rwanda Environment Management Authority (REMA)

The Organic Law on environment places the responsibility of environmental protection on REMA as the coordinating agency. REMA is charged with the overall role of providing oversight in regard to monitoring for all project activities that have potential impacts on the environment in Rwanda. REMA will undertake periodic monitoring of the investment projects by making regular site inspection visits to determine compliance with the investment projects ESIAs approved and will further rely on the submitted annual audit reports submitted for each investment project annually as required by Organic Law as a way of monitoring.

6.9.3 Rwanda Development Board

RDB will provide approvals and ESIA licence to all the investments based on the ESIA reports submitted, without RDB's approval implementation of the investment project will not move forward.

6.9.4 BRD-Social and Environmental Management Systems Coordinator

BRD has an SEMS coordinator who will provide oversight, screening of sub projects, preparation of ToRs for ESIAs, facilitation, coordination, review of ESIAs, monitoring and evaluation of all the sub projects. The environmental and social specialists will submit quarterly monitoring reports of all active investments under implementation to the World Bank.

6.10 BRD's Social and Environmental Due-Diligence and Evaluation Procedures

6.10.1 Procedures for evaluating social and environmental risks

All prospective BRD clients are asked to provide information about the nature of the project for which financial assistance is being requested. In addition to the industry sector, a brief description of activities, and financial viability of the project, prospective clients need to inform BRD on the following, as applicable, for each phase of the project (e.g., location, construction, and operation): environmental issues (air, land, water, natural resources, nature (flora and fauna) and built environment); worker health and safety issues; labour issues (employment conditions and labour rights; social issues (community interactions, relocation, cultural heritage and indigenous people).

For each social and environmental component, the project proponent is asked to provide a description of mitigation and enhancement measures to avoid or reduce the impact. All applications received by BRD are screened against BRD's exclusion list to determine if the activity for which financing is being requested is eligible under BRD's social and environmental policy.

6.10.2 Social and Environmental Due-Diligence and Evaluation Note

Social and Environmental Due-Diligence

Compliance with applicable national laws on environment, health, and safety is verified. The project proponent will be asked to provide copies of all necessary permits and required documents or to obtain these before the application is further evaluated.

If other areas of noncompliance are identified, the project proponent will be asked to develop a plan for corrective action within a reasonable time frame to be included as a condition of signing or disbursement in the loan agreement.

Additional social and environmental due diligence is conducted for certain complex Medium Risk (Category B) and High Risk (Category A) projects. This includes a review to ensure that the following information has been provided by the project proponent as part of the application process and also that it meets, as applicable, the requirements set forth in international best practice guidelines:

1. Integrated assessment to identify the social and environmental impacts, risks and opportunities of projects. The project proponent is expected to assess the potential social and environmental risks and impacts of the project, which will include:

    - Environmental Impact Assessment: The preparation of an acceptable Environmental Impact Assessment (prepared with the help of consultants with appropriate expertise and experience) is required under Rwandan law and applies to all High Risk (Category A).
    - Additional Social and Health Impact Assessment: A Social and Health Impact Assessment (prepared with the help of consultants with appropriate

expertise and experience) is also required for all High Risk (Category A).

2. Management of social and environmental performance throughout the lifecycle of the project. Where social and environmental impacts have been identified in the integrated assessment, the project proponent is asked to develop a management system to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions as appropriate. This should include the preparation of a Social and Environmental Management Plan (with assistance from a qualified external consultant, recognized by Rwanda Development Board and Rwanda Environmental Management Authority (REMA) as necessary), in which specific mitigation measures and actions (commensurate with the level of risk of the project) are described to address potential impacts.

3. Community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them. When local communities are affected by a project, the project proponent will be asked to develop a process for community engagement to build and maintain over time a constructive relationship with these communities. This should include the following:

   - **Disclosure**: The project proponent will be asked to publicly disclose to affected communities' information on the purpose, nature and scale of the project; the duration of proposed project activities; and any risks to and potential impacts on those communities.
   - **Consultation**: The project proponent will be asked to undertake a consultation process so that affected communities have the opportunity to express their views on project risks, impacts and mitigation measures, and to allow the project proponent to consider and respond to expressed concerns. As appropriate and necessary, the project proponent may establish a grievance mechanism to facilitate on-going resolution of concerns. BRD shall check to ensure both disclosures and consultations are done as stipulated by Rwanda Development Board (RDB).

Evaluation Note

The due-diligence findings are compiled into an Evaluation Note, which summarizes the social and environmental risks and also includes identification of necessary corrective actions to mitigate potential impacts. Investment Analysts/Officers will recommend the frequency and extent to which monitoring needs to be conducted by BRD to ensure that identified corrective actions are implemented effectively to mitigate social and environmental impacts as necessary.

6.11 BRD's Internal Safeguards Roles and Responsibilities

BRD, has a robust internal mechanism for ensuring safeguards in all its investments and clearly stipulates the roles and responsibilities of different departments and staff with respect to environmental and social safeguards. Although the implementation of the environmental guidelines is a collective responsibility of every employee in the Bank, the

primary responsibility for implementing these social and environmental guidelines lies with the following people: Board of Directors (BoD, Executive Committee, Credit Risk Committee, Department of Risk Management and Compliance. Below is a detailed outline of the roles and responsibilities of various departments in ensuring environmental and social safeguards within BRD.

6.11.1 Executive Committee

The Banks Executive Committee undertakes the following roles:

- Reviews and provides final sign off on the SEMS to ensure that it is integrated as part of BRD's standard operating procedures.
- Submits to external stakeholder's annual reports on the social and environmental performance of BRD's financial performance

6.11.2 Credit Risk Committee

The Credit Risk Committee:

- Reviews the Evaluation Note and provide a recommendation for approval or rejection to the Management Committee;
- Reviews the SEMS annually or as issues arise that require immediate revision of the procedures;
- Notifies Senior Management of adverse incidents and accidents (depending on the severity); and,
- Reviews annual social and environmental performance reports prior to submitting it to Senior Management for final approval.

6.11.3 Division of Risk Management and Compliance

The Division of Risk Management and Compliance:

- Is responsible for overall oversight of the SEMS;
- Reports to the Credit Risk Committee on matters relating to the social and environmental risks associated with projects;
- Periodically reviews and update the SEMS to ensure that social and environmental impacts and risks are properly managed;
- Ensures that sufficient internal resources are allocated to allow for the effective implementation of the SEMS; and,
- Notifies external stakeholders of changes in the staff designated as the SEMS Coordinator.
- Tracks any changes in the Rwandan regulatory framework that pertain to the environment, land use, labor health and safety issues, indigenous people and cultural artifact;

6.11.4 SEMS Coordinator

The SEMS Coordinator (based in the Risk Management and Compliance Division) :

- Assists with the day-to-day implementation of the SEMS to ensure that these procedures are integrated with the BRD's credit risks procedures;
- Serves as a focal point for information on social and environmental best practices relevant to BRD's investment activities;

- Ensures that internal briefings on emerging social and environmental issues are provided to staff as necessary;
- Periodically monitor BRD staff (in particular Analysts) to identify potential difficulties encountered in the implementation of the SEMS;
- Ensures that updated electronic and hard copies of the SEMS are available to all BRD staff;
- Tracks changes in the social and environmental regulatory framework; and,
- Oversee the preparation of annual social and environmental performance reports.

6.11.5 Investment Division

- Oversees the social and environmental due diligence process, especially with regards to compliance with applicable Rwandan laws;
- Supervises additional social and environmental due diligence conducted for certain complex Medium Risk (Category B) and High Risk (Category A) projects, to ensure that it meets, as applicable, the requirements set in international best practice guidelines; and,
- Reviews Evaluation Notes to ensure completeness prior to submitting to Risk Management Division.
- Conducts appraisals of all projects, comprising screening against BRD's exclusion list, technical review and site visit (including social and environmental aspects), risk categorization, social and environmental due diligence (including identification of corrective action and recommendation of monitoring frequency);
- Conducts monitoring of all projects, comprising a regular site visit (including review of social and environmental performance and identification of corrective actions); and,
- Promptly notifies Investments Departments of any fact or situation that is likely to result in non-compliance with applicable social and environmental requirements.

6.11.6 Credit Administration Department

- Undertakes Ongoing monitoring of all projects that are being implemented or that are in operation;
- Reviews the social, environmental, and financial performance of all projects and prepare periodic reports on BRD's portfolio for the Risk Management Division;
- Follows up with clients if additional measures for corrective action are necessary, based on a review of risk and recommendations from the Risk Management Department;
- Ensures that the Evaluation Note is updated with monitoring information throughout the duration of the investment;
- Reviews the social and environmental performance of all projects and prepares periodic reports on BRD's portfolio for the Risk Management and Compliance Department; and,

- Immediately follows up with clients when BRD becomes aware of any accidents or incidents, or when clients report directly to BRD on any such events, and inform the Risk Committee.

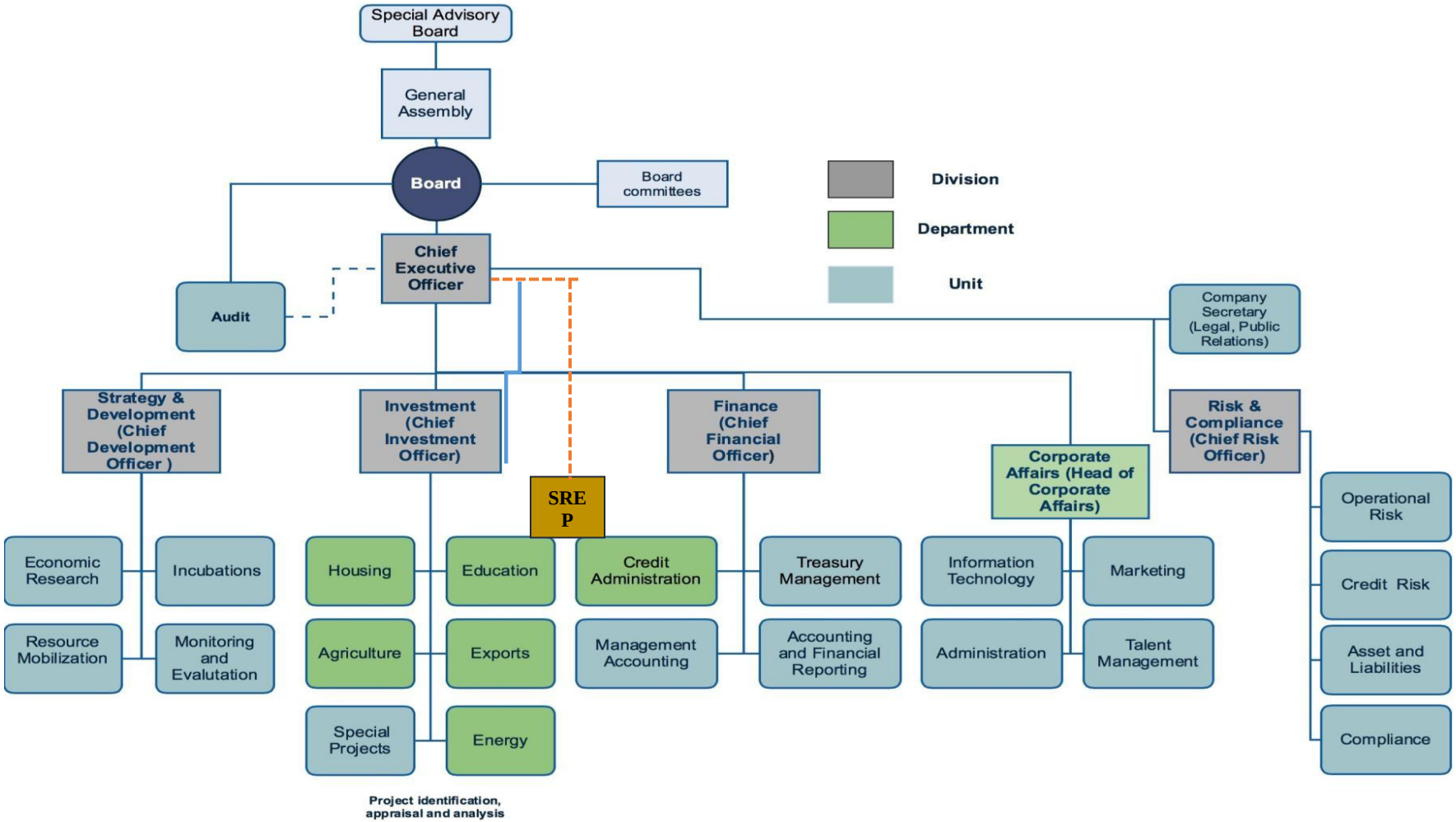
6.11.7 Credit Risk Analysts/Officers

- Reviews the findings and social and environmental risk assessment provided in the Evaluation Note;
- Requests additional information to determine if the environmental risk category, social and environmental risk assessment or proposed corrective actions are satisfactory or need to be revised;
- Revises the risk category of a project if it has the potential to negatively affect environmentally sensitive areas or socially sensitive issues;
- Reviews periodic reports from the Monitoring Unit on the social, environmental, and financial performance of all projects; and,
- Evaluate project performance (especially if High Risk (Category A)) and recommend additional **measures for corrective action, as necessary, to the Monitoring Unit.**

6.11.8 Legal Unit

- Ensures that all legal agreements contain appropriate covenants to comply with BRD's social and environmental policy and applicable social and environmental requirements as set out in the SEMS.

6.12 BRD ORGANIZATIONAL CHART WITH PROPOSED SREP_PIU



- The overall responsibility of the SREP project implementation resides with the BRD Chief Executive Officer supported by the Chief Investment Officer and the Senior Manager-Energy Financing.
- All identified staff here below are the proposed composition of the SREP_PIU

6.13 LIST OF PROPOSED STAFF FOR THE SREP-PIU

Existing staff:

-Senior Manager Energy/PIU Coordinator	1
-Investments officers	2
-Legal Officer	2
-Risk Officer	1
-Monitoring and Evaluation Officer	1
-Disbursement Officer	1
-Credit Monitoring Officer	1

Staff to be hired:

-Electrical Engineer/Analyst	1
-Off-grid Engineer/Specialist	1
-Safety & Environment Officer	2
-Management Accounts Officer	1
-Project internal auditor	1

7 PROJECT REVIEW, COORDINATION & IMPLEMENTATION ARRANGEMENTS

7.1 Sub Project Investment Review

The Organic Law require that all projects be subjected to a review and screening process in order to determine whether a full scale ESIA is necessary or otherwise. This is done through preparation of a project report which will be prepared by BRD jointly with the for specific sub project investment. Each investment will need to be reviewed independently for potential environmental and social impacts. In cases where a full scale ESIA is required, it will be paramount that the feasibility studies occur concurrent with the ESIA study in order to ensure that the findings of the ESIA are incorporated in the feasibility study at the design stage. This will ensure that environmental sound design including proposed mitigation measures as well as alternatives are incorporated in the feasibility reports at the design stage hence avoiding design change at an advanced stage.

The REFP has been rated as category **F1 and BRD, the recipient of the funds will undertake sub-project screening and categorization (A, B or C) and handle such sub projects by preparing full EIA, or ESMP based on the screening determination. accordingly**

No REFP sub project support will be provided until (i) BRD has presented the WB with a certified copy of the positive conclusion of the relevant national authority or - as the case may be - the World Bank determines that no further environmental review is required, and (ii) the World Bank has reviewed and cleared the environmental documentation and issued its formal no objection.

Consultation and Disclosure Requirements: In addition to the environmental documentation requirements described above, World Bank Operational Policy 4.01 (paragraphs 15 and 16), and the WB Policy on disclosure stipulates that the following consultation and disclosure requirements be utilized for all Category A sub projects:

Consultation should occur at least twice, once near the beginning of the EA process and once when a draft final report has been disclosed. During the EA process, the applicant shall consult groups affected by the subproject and local NGOs about the subproject's environmental aspects and take their views into account. The applicant shall initiate such consultations as early as possible. Consultations with stakeholders should take place only ones after a draft EA report is prepared. In addition, the applicant shall consult with such groups throughout project implementation as necessary to address EA-related issues that affect them.

For meaningful consultations, the applicant shall apply the following disclosure requirements:

- The applicant shall provide relevant material in English and/or the local language (as appropriate) in a timely manner prior to consultation;

- The applicant shall make the draft ESIA report including a detailed summary of the ESIA's conclusions available at a public place accessible to groups affected by the subproject and local NGOs.

7.1.1 Screening and investment project preparation

Screening of investments will commence right at the project inception phase as soon as the specific sub project details are known including nature and scope, proposed location and area among other parameters. Screening is expected to happen concurrently with the project specific feasibility studies so that any potential impacts identified through screening are immediately incorporated into the feasibility study hence ensuring that environmental sound design of the sub projects occurs right at the project design phase.

The screening process could result in any of the following determination; -

1. Full ESIA
2. A stand-alone ESMP or
3. No further environmental study

7.1.2 Who prepares a screening checklist?

RDB is the institution designated to make a decision on whether a full scale ESIA is necessary for proposed investments or otherwise. To make this determination, a project brief must be submitted to RDB in order to make a determination and this is part of the screening. The project/screening report will be prepared by BRD Environmental Officer and then submitted to RDB for further determination.

The Bank also requires that sub project investments are screened in order to make a determination as to whether a full scale ESIA, a standalone ESMP or no further environmental studies are needed for investments.

However, bearing in mind that the Bank will never recommend a less stringent environmental study than RDB, even if RDB could do so according to its own policies, but (b) recognizing that the Bank may require a more stringent study than RDB does and if so, that more stringent requirement will apply to the sub project concerned.

This implies that even if the screening is done to meet the bank requirements and a decision is made that an ESMP alone is sufficient by the Bank, the Bank will still expect that BRD prepare a full ESIA if RDB directs so. On the other hand, if RDB determines that no ESIA is required following screening and submission of project report, and the Bank feels that project requires an ESIA, then the sub project executing agency will need to prepare the same to satisfy and get approval for the sub project from the Bank.

***Format 1.0*: SCREENING CHECKLIST (Filled and prepared by BRD's environmental and social experts)**

REP Project:	**Select relevant project**
Project Investment name	[type here]
Location	[type here]
Estimated cost (USD)	[type here]

TYPE OF PROJECT OR ACTIVITY

Sub Project Type

- ☐ Construction of Mini Grid Systems
- ☐ Construction/Installation of solar panels

Please give more details: [type here]

For all projects, an Environmental and Social Management Plan (ESMP) will be required. In addition, the following studies may be required:		
Will this project affect vulnerable and marginalised groups? If yes, a Vulnerable and Marginalised Groups' Plan will be required	☐	☐
Will the project require land for its development, and therefore displace individuals, families or businesses from land that is currently occupied, or restrict people's access to crops, pasture, fisheries or forests, even, whether on a permanent or temporary basis. If yes, a Resettlement Action Plan will be required	☐	☐
Will the investment project involve the construction of small mini hybrids?	☐	☐
Will the Project:	**Yes**	**No**
Adversely affect natural habitats nearby, including forests, rivers or wetlands?	☐	☐
Require large volumes of construction materials (e.g. gravel, stone, water, timber, firewood)?	☐	☐
Use water during or after construction, which will reduce the local availability of groundwater and surface water?	☐	☐
Affect the quantity or quality of surface waters (e.g. rivers, streams, wetlands), or groundwater (e.g. wells, reservoirs)?	☐	☐
Be located within or nearby environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?	☐	☐
Lead to soil degradation, soil erosion in the area?	☐	☐
Create waste that could adversely affect local soils, vegetation, rivers and streams or groundwater	☐	☐
Create pools of water that provide breeding grounds for disease vectors (for example malaria or bilharzia)?	☐	☐
Involve significant excavations, demolition, and movement of earth, flooding, or other environmental changes?	☐	☐
Affect historically-important or culturally-important site nearby?	☐	☐
Require land for its development, and therefore displace individuals, families or businesses from land that is currently occupied, or restrict people's access to crops, pasture, fisheries, forests or cultural resources, whether on a permanent or temporary basis?	☐	☐
Result in human health or safety risks during construction or later?	☐	☐
Involve inward migration of people from outside the area for employment or other purposes?	☐	☐
Will the Project:	**Yes**	**No**
Result in conflict or disputes among communities?	☐	☐
Affect indigenous people, or be located in an area occupied by indigenous people?	☐	☐
Be located in or near an area where there is an important historical, archaeological or cultural heritage site?	☐	☐
Result in a significant change/loss in livelihood of individuals?	☐	☐
Adversely affect the livelihoods and /or the rights of women?	☐	☐

If you have answered Yes to any of the above, please describe the measures that the project will take to avoid or mitigate environmental and social impacts

[type here]

What measures will the project take to ensure that it is technically and financially sustainable?

[type here]

If the answer to any of questions "Yes", please use the indicated Annexes or sections(s) of the ESMF for guidance on how to avoid or minimize typical impacts and risks.

When considering the location of an investment, rate the sensitivity of the proposed site in the following table 10 according to the given criteria. Higher ratings do not necessarily mean that a site is unsuitable. They do indicate a real risk of causing undesirable adverse environmental and social effects, and that more substantial environmental and/or social planning may be required to adequately avoid, mitigate or manage potential effects.

CONCLUSION

Which course of action do you recommend?

□ **FULL ESIA** □ **ESMP** □ **RAP/RPF is the reference document with reference to resettlement issues**

□ **OTHER ENVIRONMENTAL/SOCIAL PLANS**

□ There are no environmental or social risks

[Type here]

If a RAP is required, will the project Displace or restrict access for less than 200 individuals, or if over 200, are losses for all individuals less than 10% of their assets?

If Yes, Prepare an abbreviated RAP □
If No, Prepare a full RAP □

Full details of resettlement requirements are provided in the accompanying Resettlement Policy Framework.

Completed by: [type here]
Name: [type here]
Position: [type here]
Date: [type here]

Completion of this screening form will facilitate the identification of potential environmental and social impacts, determination of their significance, assignment of the appropriate environmental category, proposal of appropriate environmental mitigation measures, or recommend the execution of an Environmental and Social Impact Assessment (ESIA), if necessary.

Development of project reports follows systematic process as follows;

- *Review of TORs with the implementing partners for adequacy*
- *Familiarization with project design*
- *Familiarization with projects area of influence*
- *Identification of the relevant statutes and WB safeguard policies*
- *Determination/ Identification of all stakeholders to project*
- *On-the-ground investigations of the bio-physical baseline*
- *Consultations with stakeholders*

- *Impact prediction and interpretation*
- *Identification of mitigation measures*
- *Development of an environmental management plan complete with budget and identification of responsibilities*
- *Finalization of project report*

7.1.3 Statutory content of Project Reports:

The first step of the EIA process is a developer submitting an application for EIA of a proposed project to RDB in form of a Project Brief. RDB registers the Project Brief as the developer's formal application for an EIA. The purpose of a Project Brief is to provide sufficient information on the project for the screening process. According to the flow chart provided in the EIA General Guidelines, the screening process shall take 10 working days, starting from the EIA application.

Once a project report is submitted to RDB, a decision is made by RDB and in the event that RDB, based on the project report submitted makes a decision that an ESIA report must be prepared, the BRD required to identify independent registered expert(s) to prepare an ESIA report.

Project briefs are normally prepared as a means of informing RDB of the proposed development such that after review of the report, RDB advises on the need or otherwise for a full ESIA. The ESIA regulations allow for approval of proposed projects at the Project Report Stage and have been effectively used by RDB to grant Environmental Licenses to small projects without requiring a full ESIA.

Project investment is approved. Where RDB and lead agencies ascertain that a project report has disclosed adequate mitigation for identified impacts, the project is approved by RDB upon which, conditions attached to grant of an Environmental License are issued. Once these are fulfilled, an Environmental License is also issued subject to conditions which will be specific to the sub project in question. Among these is the requirement that the scheme design should not be altered without approval by RDB. As well, an audit report is required of each project after the first year of completion.

Project Report discloses potential for major irreversible adverse impacts. In this case, RDB may not approve the project.

Table 12: Possible Outcomes of RDB Review of Project Reports

Outcome	Recommendation	Important precautions
Project found to have no significant Social and Environmental Impacts or Project report discloses sufficient mitigation measures	An Environmental License will be issued by RDB	Project report must disclose adequate mitigation measures and show proof of comprehensive consultations within the area of influence.
Significant adverse social and environmental impacts found or Project Report fails to disclose adequate mitigation measures.	A full cycle EIA will be required by RDB	As above
A proponent is dissatisfied with the outcome of the RDB review.	An Appeal is provided for	

In the eventuality that a Project cannot be approved by RDB on the basis of a Project Report, the proponent will be advised to undertake full cycle ESIA leading to development of a fully-fledged Environmental and Social Impact Assessment Study Report.

7.1.4 Scoping and Scoping Process

The formulation of the Terms of Reference is a required step of the EIA process as mentioned in the Ministerial Order No. 003/2008. According to the General Guidelines, scoping is the first step of the environmental impact study phase and requires the input of relevant Lead Agencies, stakeholders and the developer to determine what should be included in the study and the alternatives to be considered. An important step of the scoping procedure involves the formulation of the Terms of Reference (ToR).

Any relevant comments raised by the public after review of Project Briefs of IL-3 and IL-2 projects will also be incorporated in the ToR. The Ministerial Order No. 003/2008 implies that RDB shall submit the ToR to the developer, but that the developer may also prepare the ToR provided they are approved by the authority before conducting the study. At the end of the scoping exercise, the scoping report produced is submitted to RDB for review. When ToR have been approved by RDB, they are sent to the developer as authorisation to commence the environment impact assessment study. The Ministerial Order 03/2008 specifies that within 30 calendar days after the starting document has been received and after its analysis (screening phase), the RDB shall submit the Terms of Reference to the project developer for the environmental impact study.

7.1.5 Assessment and reporting

The Ministerial order 03/2008 specifies that the proponent shall select the experts for conducting the EIA study from a list of experts that is published by the Ministry in charge of the environment. RDB ensures that the experts chosen by the developer to undertake the study have appropriate specializations for doing so. The General EIA Guidelines specify the environmental assessment process leading to the EIA report.

During the investigation phase of the EIA process, the initial state of the environment is firstly analysed, using scientific data, photographs of the area, or any other geophysical recordings. Furthermore, potential socio-environmental impacts are identified and analysed. This includes environmental, social and economic impacts. Also, mitigation measures are identified, viable alternatives are considered and a schedule and details for a monitoring system is developed.

Thereafter, EIA experts produce an Environmental Impact Report which includes an Environmental Management Plan (EMP) and submits it to the developer. The developer reviews the report and can, if found to be necessary, attach a supplementary addendum with additional information to the report. Thereafter, the developer submits the report to the RDB.

7.1.6 Review process

The Organic Law (2005) determines that the RDB or any other person given a written authorisation by the Authority shall examine and approve the EIA. According to the

Ministerial Order 003/2008 the RDB shall analyse the EIA report to verify its conformity to the Terms of Reference. The RDB will also check the document for completeness before passing them on to lead agencies and stakeholders for review. Copies are forwarded to relevant lead agencies, local governments and general public for them to provide comments that would be useful for making a final decision about approval of the proposed project.

Within RDB, EIA documents are reviewed by two committees, namely; a Technical Committee and an Executive Committee. EIA documents submitted to RDB are first reviewed by a Technical Committee. The EIA documents are then also reviewed by the Executive Committee, which makes the final decision on acceptability of a proposed project. The review by Executive Committee shall emphasize implications of identified impacts, their mitigation measures and input from public hearings. According to the Ministerial order 03/2008, Article 8, the RDB shall accept the EIA report or request for additional information from the developer within 20 working days. These timeline of 20 days may be extended by RDB. If a public hearing is held an additional 30 days can be required from the date of the public hearing notification.

7.1.7 Decision-making

When the review of EIA documents is completed, the Executive Committee shall decide to either approve the project with or without conditions, or reject it. The public hearing report and environmental impact report are used for taking this decision, which is expressed in a Record of Decision document. If the project is approved through a Record of Decision, two permitting documents are issued: an Implementation and Operations Order (IOO) and an EIA Certificate of Authorization.

7.1.8 Monitoring, Compliance and Enforcement

According to Rwanda's General Guidelines, monitoring should be done during both construction and operation phase of the project.

7.1.9 Public participation requirements for EIA process stages

The Organic Law requires that the public must be informed and consulted on a proposed development. Also, Article 9 of Ministerial Order No. 003/2008 states that stakeholders must be given the opportunity to comment on the environmental impact report and express their views concerning the impact of the proposed project. According to the General EIA Guidelines, there are three major stages at which public involvement occurs in the EIA process: (1) before commencing an EIA study, (2) as part of a public consultation phase that occurs during the study, and (3) after completion of the EIA report.

1. After receiving a Project Brief, RDB determines in collaboration with a lead agency whether a public hearing is necessary.
2. During the EIA study the public is further consulted by EIA experts. This is particularly done during the scoping process and any other crucial stages considered necessary by the Authority.
3. After the EIA report has been submitted, it is published by RDB and copies are made for relevant stakeholders. As part of the review process of the EIA report, a

public hearing and post-public hearing consultations can be held, if deemed necessary by RDB.

The General Guidelines recognize several ways for public participation. They mention that it depends on circumstances of each EIA which of the following methods are considered appropriate:

- Public review of Environmental Impact Report,
- Informal group meetings with local community groups and leaders,
- Workshops,
- Public displays or bulletin boards posted in communities,
- Public notification and calls for written comments on proposed project/activities,
- Participation in scoping processes,
- Survey of a groups or individuals who are representative of the various interests being affected by a proposal,
- Consultation with focus groups to identify issues specific to certain stakeholders,
- Comment and review of the EIA,
- Distribution of relevant documents to the interested members of the public.

Under the provisions of the Ministerial Order, RDB generally is responsible for managing the public hearing process and providing publicity for the hearing. Where a lead agency is the developer, the RDB will organize the public hearings. For private projects, they are organized by the private developers. During a public hearing, the developer will be given time to deliver a presentation to stakeholders, describing the project, perceived impacts and proposed mitigation measures.

For completeness, the developer may also discuss findings of the impact assessment study. If a public hearing is held during scoping, the developer should be available to describe the project, potential impacts and proposed mitigation measures to stakeholders. Developers may adopt their legal counsels or EIA experts as either principal or secondary speakers during presentation at public hearings. On completion of this process, RDB compiles a public hearing report. More detailed guidelines for public hearings are provided in Chapter 6 of the General guidelines.

7.1.10 Access to information

The EIA report is made available to the public and also the Policy Brief in case the RDB decides that a public hearing shall be held at that stage already. Both the Ministerial Order and the General Guidelines specify requirements for public notice, and the requirements for publicizing project proposals are similar, but not in precise agreement. The Ministerial Order, which was issued later, requires publishing the project proponent's name and address as well as the project details using at least one of the following means to provide notice of the day, time and venue for the public hearing:

- Publishing a notice twice in any local newspapers;
- Running four (4) radio announcements;
- Putting up posters at the site of the proposed development.

7.1.11 Public comments in decision-making

The comments of the public are considered in different stages of the EIA process. The EIA Guidelines determine how RDB shall react to public comments on the EIA report during the review process. They stipulate that once RDB is satisfied with particular concerns of the public, it shall require the developer to carry out a more in-depth study of specific aspects of contention in order to take into account all the necessary measures to address the issues raised by the public. They also specifically mention that where a lead agency or government ministry/department is the developer, the same process and requirements have to be held.

RDB will then present the written requirements concerning necessary steps to address issues of mitigation and compliance to the ministry/department which undertakes the development project. Furthermore, the EIA General Guidelines promulgate that RDB shall consider public views when deciding whether or not to approve a proposed project. The Public Hearing Report further shall be considered for the formulation of the IOO conditions.

7.2 Overall Project Compliance and Reporting

The ESMF will be utilized by BRD. **Table 13** provides a summary of the stages and institutional responsibilities for the screening, preparation, assessment, approval and implementation of the REFP activities.

Table 13: Screening Responsibilities.

No.	Stage	Institutional responsibility	Implementation responsibility
1.	Screening of Environmental and Social Infrastructure Project to assist in project formulation using checklist	BRD,	Environmental Officer (EO) /Safeguard specialists in BRD
2.	Determination of appropriate environmental assessment level/ category	RDB	-
3.	Implementation of environmental assessment If ESIA is necessary	BRD to hire EIA consultants	Environmental Officer (EO) /Safeguard specialists in BRD
3.1	Preparation of Terms of Reference	RDB and BRD	RDB and BRD Environmental Officer
3.2	Validation of ESIA/ESMP TOR	RDB / World Bank	RDB and BRD Environmental Officer
3.3	Selection of Consultant	BRD	Environmental Officer (EO) /Safeguard specialists in BRD
3.4	Realization of the EIA, Public Consultation Integration of environmental and social management plan issues in the tendering and project implementation	BRD's EIA consultants	BRD's EIA consultants
4.	Review and Approval	RDB / World Bank	
4.1	ESIA Approval (Category A, high-risk B)	RDB / World Bank	
4.2	Simple ESIA/ESMP Approval (Category B and C)	RDB /World Bank	
5.	Public Consultation and disclosure	BRD's EIA consultants	BRD's EIA consultants
6.	Surveillance and monitoring	BRD's EIA consultants /REMA/World Bank	Environmental Officer (EO) /Safeguard specialists in BRD
7.	Development of monitoring indicators	BRD's EIA consultants	Environmental Officer (EO) /Safeguard specialists in BRD

8 CAPACITY BUILDING, TRAINING AND TECHNICAL ASSISTANCE

8.1 Institutional Capacity for ESMF Implementation

The principal institution that will provide overall coordination including administration of the REP is the BRD in order to ensure environmentally sound design and management of proposed project investments.

BRD is implementing a robust social and environmental policy prepared in 2013 and an Environmental and Social Management System, which is compliant with Rwandan regulatory framework that pertains to the environment, land use, labor health and safety issues, vulnerable and marginalized groups and cultural artifacts.

BRD is well equipped with professionals who over the years have received training in environmental and social risk management and therefore should be up to the task under the proposed Project. However, BRD may have to hire additional staff and dedicate them to the proposed Project. BRD will appoint Social Safeguards and Environmental Safeguards officers who will be responsible for supervising the implementation of safeguards instruments and ensure that activities comply with ESMF/RPF and, if necessary, an Environmental Management Plan/Resettlement Action Plan are developed as appropriate

8.2 ESMF Implementation Budget

The estimated total cost for ESMF implementation cannot be estimated because of variation from project to project. The table below however, highlights the key indicative aspects that would require a cost budget.

Table 17: Overall costs for implementation of ESMF in REP

Activity	Description	Unit cost, US$	Total Cost, US$
Preparation and implementation of ESIAs, ESMPs and related safeguard management plans for investments funded from the investment pool	Recruitment of Consultants and experts to prepare and review the ESIAs and ESMPs		400,000
Monitoring of ESIAs, ESMPs and related safeguard management plans	Recruitment of Consultants and experts to monitor the ESIAs and ESMPs		300,000
Awareness creation and Capacity building	Training workshop/seminars on Programme for project staff	250,000	250,000

9 PUBLIC CONSULTATION AND DISCLOSURE

9.1.1 ESMF Disclosure

The World Bank disclosure policies require that ESMF are disclosed as well as ESIA reports for sub projects are made available to project affected groups, local NGOs, and the public at large. Public disclosure of ESIA documents is also a requirement of the Rwanda's environmental procedures.

BRD in collaboration with RDB will make available copies of the ESMF and ESIAs on the respective websites and offices of the ministries. Public notice in the media should be used to serve as information source to the public. However, the ESIAs will have to be advertised in the local newspaper, website of RDB, that of the executing agency. The notification should provide:

9.1.2 Public Consultation

The implementation of each specific sub project investment under the REP will require that public consultation and stakeholder engagement is carried out as a means of gathering information on public concerns, issues, perception, fears and suggestions on proposed investment. Public consultation will be conducted in line with the requirements of Organic Law which calls for utilisation of all forms of consultation and stakeholder engagement and the Bank's requirements for public consultation. The consultations will be conducted through among others;-

- *Key Informant Interviews*
- *Direct Interviews with Project Affected Persons*
- *Workshops and Meetings*
- *Public Hearings*
- *Advertisements' in the print and electronic media*
- *Focus Group Discussions*
- *Internet and telephone interviews*

9.1.3 Grievance Mechanism

Grievance mechanisms provide a formal avenue for affected groups or stakeholders to engage with the project implementers or owners on issues of concern or unaddressed impacts. Grievances are any complaints or suggestions about the way a project is being implemented. They may take the form of specific complaints for damages/injury, concerns about routine project activities, or perceived incidents or impacts. Identifying and responding to grievances supports the development of positive relationships between projects and affected groups/communities, and other stakeholders.

The World Bank standards outline requirements for grievance mechanisms for some projects. Grievance mechanisms should receive and facilitate resolution of the affected institutional or communities' concerns and grievances.

The World Bank states the concerns should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, at no cost and without retribution. Mechanisms should be appropriate to the scale of impacts and risks presented by a project.

Grievances can be an indication of growing stakeholder concerns (real and perceived) and can escalate if not identified and resolved. The management of grievances is therefore a vital component of stakeholder management and an important aspect of risk management for a project. Projects may have a range of potential adverse impacts to people and the environment in general, identifying grievances and ensuring timely resolution is therefore very necessary.

9.2 World Bank Grievance Redress Service

Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

9.2.1 Establishment of Grievance Redress Committee

Each sub project investment will have a Grievance Redress Committee (GRC) established for the purpose of handling grievances related to environmental and social concerns. The GRCs will be ad hoc institutions established primarily for the sub project investment and will have no legal mandate. The GRC will comprise of:

1. Project Affected Persons representative
2. Environmental and Social Specialists from BRD
3. Local Government representative
4. Representatives from relevant line ministries
5. Contractor/Engineers
6. Women and Youth Representatives
7. Representation of active NGOs or CBOs in project area

Table 11: Grievance Redress Process

Process	Description	Time frame	Other information
Identification of grievance	Face to face; phone; letter, e-mail; recorded during public/community interaction; others	1 Day	Email address; hotline number
Grievance assessed and logged	Significance assessed and grievance recorded or logged (i.e. in a log book)	4-7 Days	Significance criteria: Level 1 –one off event; Level 2 – complaint is widespread or repeated; Level 3- any complaint (one off or repeated) that indicates breach of law or policy or this ESMF provisions
Grievance is acknowledged	Acknowledgement of grievance through appropriate medium	7-14 Days	
Development of response	Grievance assigned to appropriate party for resolution Response development with input from management/ relevant stakeholders	4-7 Days 7-14 Days	
Response signed off	Redress action approved at appropriate levels	4-7 Days	Project staff to sign off
Implementation and communication of response	Redress action implemented and update of progress on resolution communicated to complainant	10-14 Days	
Complaints Response	Redress action recorded in grievance log book Confirm with complainant that grievance can be closed or determine what follow up is necessary	4-7 Days	
Close grievance	Record final sign off of grievance If grievance cannot be closed, return to step 2 or refer to sector minister or recommend third-party arbitration or resort to court of law.	4-7 Days	Final sign off on by BRD

10 ANNEX

10.1 Annex A. List of Stakeholders Consulted

Annex 1: Attendance list for the Consultative meeting on ESMF and RPF, Kigali February 10, 2017

No	Names	Institution	Position	Phone	Email
1	Laetitia NDUWIMANA	MININFRA	M&E Specialist/ energy sector	0788403890	laetitia.nduwimana@mininfra.gov.rw
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13	Marshall BANAMWANA	MINIRENA	Environmen tal protection specialist	0788861376	mbanamwana@minirena.gov.rw
14	Clementine NIYONKURU	NGALI ENERGY LTD	Director, QA and M&E	0789181018	clementine.niyonkuru@ngali.com clenou2000@yahoo.co.uk
15	Dr Byamungu Livingstone	BRD	Chief investment Officer	0788302863	l.byamungu@brd.rw
16	Fabien SHIMIYIMANA	REG/ EUCL	Social and Environmen tal Specialist	0788737544	fanshimiyimana@eucl.reg.rw
17	Jean de Dieu TWIRINGIYIMAN A	REG/ EDCL	Off Grid Solutions Engineer	0788572831	jdtwiringiyimana@edcl.reg.rw
18	Dayan MPONGENDAME	Energy Resources Power Ltd	Business Developme nt Manager	0788451618	dmpongendame@erpowerltd.com pdayan86@yahoo.fr
19	Innocent MUKIZA	Imbarutso	President	0788641946	Mukizainnocent2@gmail.com

		Musenyi sacco Bugesera	C.A		
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32	Victor HAKUZWUMUREMYI	Energy 4 Impact	Program Technical Manager	0788577047	victor.hakuzwumuremyi@energy4impact.org
33	Tito KODIAGA	World Bank	Environmental Specialist	+254722579272	tkodiaga@worldbank.org
34	USABASE Gladys Miria	Association of Microfinance institutions in Rwanda (AMIR)	Research & performance Monitoring Officer	0788792334	miriaglad@gmail.com
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	DUSABEYEZU		Specialist		
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Annex B. Stakeholders Issues and Concerns Summary

OUTCOME OF THE CONSULTATIVE WORKSHOP ON ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF) AND RESETTLEMENT POLICY FRAMEWORK (RPF) FOR RENEWABLE ENERGY FUND PROJECT, KIGALI RWANDA, FEBRUARY 10, 2017, PORTOFINO HOTEL.

In the consultative meeting three presentations were made, one on project description, the second one on Environmental and Social Management Framework and the third one on Resettlement Policy Framework. After these presentations, participants were provided with time for question and discussions. The table below summarizes questions/concerns raised and explanations or answers provided by both Consultants and BRD management.

No	Names of the Participant PAP	Question	Answer/Comments provided
Questions about project design			
1.	Alexander BRUMMELER/Waka Waka	Why window 4 will not start at the beginning of the projects?	The BRD Chief Investment Officer explained that during the project design it was found that the three first windows are ready to start and it was decided that the window 4 (locally-registered off-grid solar companies) will be considered for activation after a detailed assessment of active REF windows' performance is conducted.
2	Donath HARERIMANA/REG	What is planned in the project to ensure that households who are getting money in SACCOs are getting money on reasonable rate?	The representative of MININFRA, Mr. Nyamvumba Robert explained that the objective of the project is to provide electricity to poor households at affordable cost and MININFRA, MINICOFIN and BRD will sit together and sets loan interest that are affordable to poor households.
3	Pacifique NKONGOLI/Urwego Opportunity Bank	What are measures in place to ensure smooth implementation of project? Is there guaranteeing Fund?	There will be a steering committee that shall oversee the project implementation and advice on matters that may arise during project implementation. BRD will also establish a Project implementation unity to monitor day to day the implementation of the project. The project has also the component on technical assistance that will provide capacity building to all institutions involved in the project implementation.
4	Samuel MPORANZI/Rwanda Standards Board	More emphases is put on Financial but what will be the role of other partners like	The today presentation was mainly on safeguards instrument but during the project design other stakeholders were consulted and

		RURA, RSB	their roles are described in project document. In addition, further consultation on other technical matters will continue during project implementation.
5	Bizimana Vianney COGEBANK	He expresses concern about long channel of funds from (World bank to MINECOFIN to BRD then to commercial bank and SACCOS before it goes to household may increase the interest rate	So far, rate are not yet set but the project will ensure that the final beneficiaries of the fund, Households, are getting affordable off-grid energy
6	Alexis MUTABINGWA from RURA	Is there any awareness campaign planned so as to attract many households?	The project has a component on technical assistance and project implementation and some of this fund shall be used for awareness.
Questions/comments about Resettlement Policy Framework (RPF)			
1	RUDASINGWA Alexis/RURA	In the past some project started implementation and operation before affected person are compensated. What is planned to avoid this situation.	The World Bank Policy OP 4.12 is clear about compensation where by compensation should be done prior any work. BRD has committed to ensure that this is implemented by making compensation as one of project approval condition.
2	Samuel MPORANZI	What happen when the developer compensate affected person and he/she did not get fund from REF	BRD will work with developers during subprojects development and the compensation will be done when BRD found that the project is Eligible and other requirements are met.
3	Donath HARERIMANA/REG	The World Bank has good policies on involuntary resettlement but it never contributes to compensation fees and this make it difficult to governments and Private people to comply with the policy. Is there any money dedicated for compensation under REF.	The compensation fees will be bearded by subproject developer because the World Bank is not involved in compensation. However the compensation process will comply with World Bank OP 4.12 on involuntary resettlement.
4	DUSABEYEZU Sébastien/ RDB EIA	In Rwanda there is no institution mandated to approve Resettlement Action Plan because it's not a requirement in expropriation law. Is there any support from the REF to handle the issue or to harmonize national requirement and World Bank requirement?	There is no such plan and the project. The RAP preparation is done under the current legal framework and they are approved by both the borrower and the World Bank. Where there are gaps between national laws and WB policies. The World Bank Policies apply.

5	Dayan MPONGENDAME/Energy Resources Power Limited	What are the requirements of developers who will implement mini-grid Project on their land?	They will be required to present ownership documents such us land titles.
		What about developers who wish to install solar system on other people roof?	They will be required to present agreement made between house owners and developer.
Questions/comments about Environmental and social management Framework ESMF)			
1	DUSABEYEZU Sébastien/ RDB EIA	How many approvals will be required for EIA prepared under REF?	The approval process will follow the existing approval process where the project developer will submit project brief to RDB for getting terms of reference. The report done by independent EIA expert will be send to RDB for approval and then to World Bank through BRD.
		Who will do the screening of subproject?	The initial screening will be done BRD and if it is found that the subprojects are likely to have environmental and social impacts, the developer will be required to submit a project brief to RDB, the institution mandated to determine the level of EIA required.
2	Marshall Banamwana /Ministry of Natural Resources	We did not have time to review the entire documents. Is there another opportunity to provided comments on documents?	Participants will continue to provide comments up to February 13, 2017, the date on which final documents are expected.

Annex C. Chance Find Procedures

The national agency responsible for cultural matters in Rwanda is the Institute of National Museums of Rwanda (INMR).

Prior to commencement of projects in culturally sensitive areas the proponent would contact INMR who would send representatives to review the site and prepare a report. The report would entail advice on professional approach to the proposed works to ensure minimal damage to the encountered items. In the event that chance finds are encountered the following procedure shall apply:

Role of the contractor

- Reporting of chance finds: The contractor or officer supervising the project would report the finds to the local administration such as the local chief;
- The local administration would then report the find to INMR.
- The contractor would report back to client who would notify INMR in the event that further artifacts are encountered

Role of

- INMR would temporarily stop the works to conduct an assessment and prepare a report. The period of stoppage is from 10 days to 21 days depending on the complexity of the project; Retrieve movable artifacts and preserve immovable ones;
- INMR would also map out the area to be preserved during the investigation period and arbitrate between the community and developers in the event of dispute;
- Circulate the cultural impact assessment report to the developer, REMA, relevant lead agencies and the community.

Measures for Care of Chance Finds

Upon retrieval of movable artifacts and conservation of immovable ones, INMR would proceed with segregation and dating of the artifacts and determination of their significance; Segregated artifacts would be stored in the INMR archeological stores according to their size and dates, and labelled with the geographical area where found; The artifacts may be displayed in an exhibition when required or published to enrich the cultural heritage.