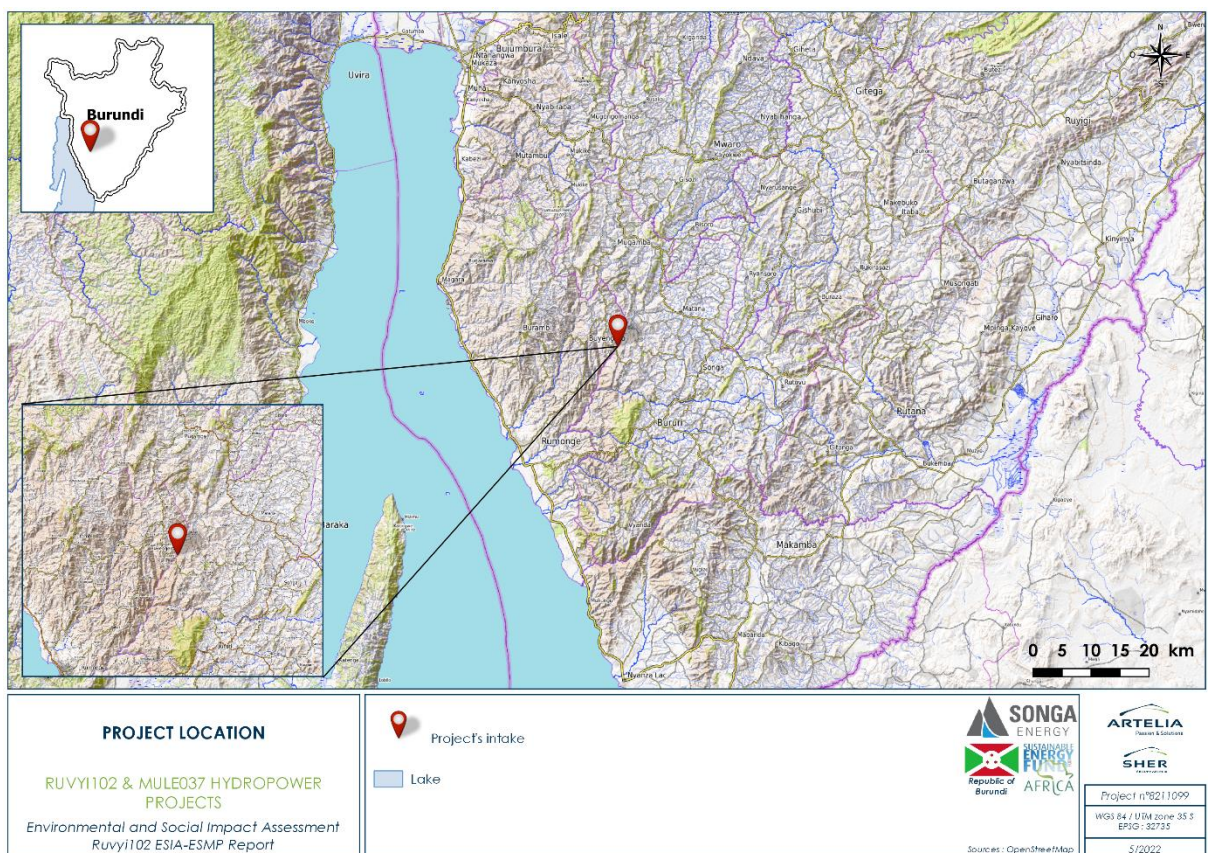


EXECUTIVE SUMMARY

INTRODUCTION

This chapter is the non-technical summary of the Environmental and Social Impact Assessment (ESIA) for the Mule037 hydropower plant construction and operation project, in Burundi. It presents a summary of the results of the project environmental and social impact assessment.

The run-off river hydropower project of Mule037 is located about 50 km to the south-east of Bujumbura in Kigabiro Colline in Songa Commune of Bururi Province, central region of the country. Mule037 hydropower project includes a set of electricity production facilities including a 9 MW plant, as well as a 0.78 km power line to evacuate the electricity produced to the national grid.



Location of the Mule037 Hydropower project site



The developer is Songa Energy, which is registered as a limited liability company in Burundi, which is a joint venture between Songa Energy US and Virunga Power. Songa Energy is developing small, 1MW to 10MW, grid-connected hydropower plants in rural Burundi. The company works with local communities and the national utility company to extend transmission lines into the area surrounding the hydroelectric plants, providing much needed electricity to hundreds of thousands of homes and businesses. In 2015 Songa Energy investigated several locations across Burundi and was given exclusive rights by the Government of Burundi to study four hydropower sites in central Burundi.

The overall objective of an impact assessment is to guide the implementation of the project in accordance with national and international regulations and with the aim of avoiding or minimizing negative impacts of the project on the natural environment, socio-economic activities and human health. The study is led by SHER Ingénieurs Conseils (Belgian consulting engineering company active worldwide) and conducted by Artelia, an independent engineering group with worldwide activities in several sectors including environment and energy.

INSTITUTIONAL AND LEGAL FRAMEWORK

Institutional framework

At the institutional level, the Ministry of Environment, Agriculture and Livestock is responsible for managing environmental issues. The Burundian Office for Environment Protection through its Directorate of Environment and Climate Change is in charge of the analysis of Environmental Impact Assessments.

A range of other ministries may be involved on specific themes, in the development of this project.

Legal framework

The political context of the project is marked by the existence of relevant political documents, framed and inspired by the Vision Burundi 2025, whose motto is: «In 2025, Burundi is a United Nation, Solidarity and Peace; A Country Built on a Society of Law with a Rich Cultural Heritage; A Prosperous Economy at the Service of the Well-Being of All».

Key policies that can provide a framework for project development include: the National Environmental Strategy, the National Water Policy, the National Climate Change Strategy, the National Development Plan (PND BURUNDI 2018-2027), the Strategic Framework for Growth and Poverty Reduction CSLP II or the National Gender Policy.

The energy sector is primarily governed by Law n°1/014 of 2000 on the Liberalization and Regulation of the Public Service of Drinking Water and Electric Power, which provides the framework for electricity generation, transmission and distribution infrastructure, including easements for electricity distribution and transmission lines. The sector is supported by The Burundian Rural Electrification Agency (Decree N°100/318 of 2011).

The environmental aspects are defined by an institutional, legislative and regulatory framework within which environmental actions in Burundi are now carried out. The Code of Environment defined by the Law n°1/010 of 30th June 2000, provides the general framework to protect and manage the environment against all forms of degradation. It is supported by a set of texts that provide the implementation of actions such as the Decree n°100/22 of 7th October 2010 on the Procedure for Environmental Impact Assessment and the Law n°1/02 of 26 March 2012 on Water Code which sets the basic rules and related institutional framework to ensure rational and sustainable management of water resources, amenities, and hydraulic public interest works.

In addition, the Constitution of the Republic of Burundi promulgated on 7th June 2018 sets out the main principles governing the Republic of Burundi. It specifies in particular the rights and duties of citizens. A whole set of texts support and frame the socio-economic context of the country. Within the framework of Mule037 project, it can be mentioned the Burundi Land Code (Law n°1/008 of 1 September 1986, revised by Law n°1/3 of 9 August 2011) which is the primary regulatory tool for the management of land assets, supported by the Ministerial Order N°720/CAB/304/2008 of 20 March 2008, updating the compensation rates for land, crops and buildings in the event of expropriation on grounds of public utility. Also, the Labor Code (Decree-Law n°1/037 of 7th July 1993), the Public Health Code (Decree-Law n°1/16 of 17 May 1982) and the Law n°1/6 of 25 May 1983 on the Protection of the Patrimony National Cultural can be cited.

Also, the national regulatory and legislative framework is supported by the conventions signed or ratified by the country as well as specific guides made by some international institutions, organizations or commissions, to take environmental and social issues into account in the implementation of project including hydropower projects. As the project plans to seek international funding, this ESIA meets the performance standards of international donors such as the African Development Bank (AfDB) operational safeguards (OS) and the International Finance Corporation (IFC) Performance Standards (PS) which cover the following themes: environmental and social assessment, labor and working conditions, land acquisition and involuntary resettlement, indigenous peoples, cultural heritage, health and safety of populations, pollution prevention, preservation of biodiversity and natural habitats, sustainable resource management.

PROJECT DESCRIPTION AND JUSTIFICATION

The Burundian electricity production potential is characterised by a high dependence on hydropower, which is largely underexploited. With less than 5% of the population having access to electricity¹, Burundi needs to develop its electricity production and supply. It is in this context that the Mule037 project is being implemented and plans to produce 9.00 MW.

It is located on the Mulembwe River that flows to Lake Tanganyika, about 40 kilometers from the mouth of the river. At the project site, the Mulembwe River forms the border between Songa Commune to the east and Buyengerero Commune to the west.

The proposed hydropower scheme features the following characteristics:

- River closure:
 - 4 m-high and 16 m-long concrete ogee shape spillway;
 - Segment control gate to keep a constant operating level;
 - Flushing and intake works, on the right bank;
 - Reinforced concrete and masonry wing walls on both river bank for the closure of the river during extreme flood events.
- Intake, on the right bank:
 - 3 intake gates;
 - Settling basin with three compartments.
 - Operation building
- Headrace pipeline on right bank:
 - 400 m long buried steel welded pipe, diameter DN2000.
- Waterway protection device:
 - Surge tank of 3 m diameter, 16 m high.
- Penstock, located mainly on the left bank of the Mulembwe:

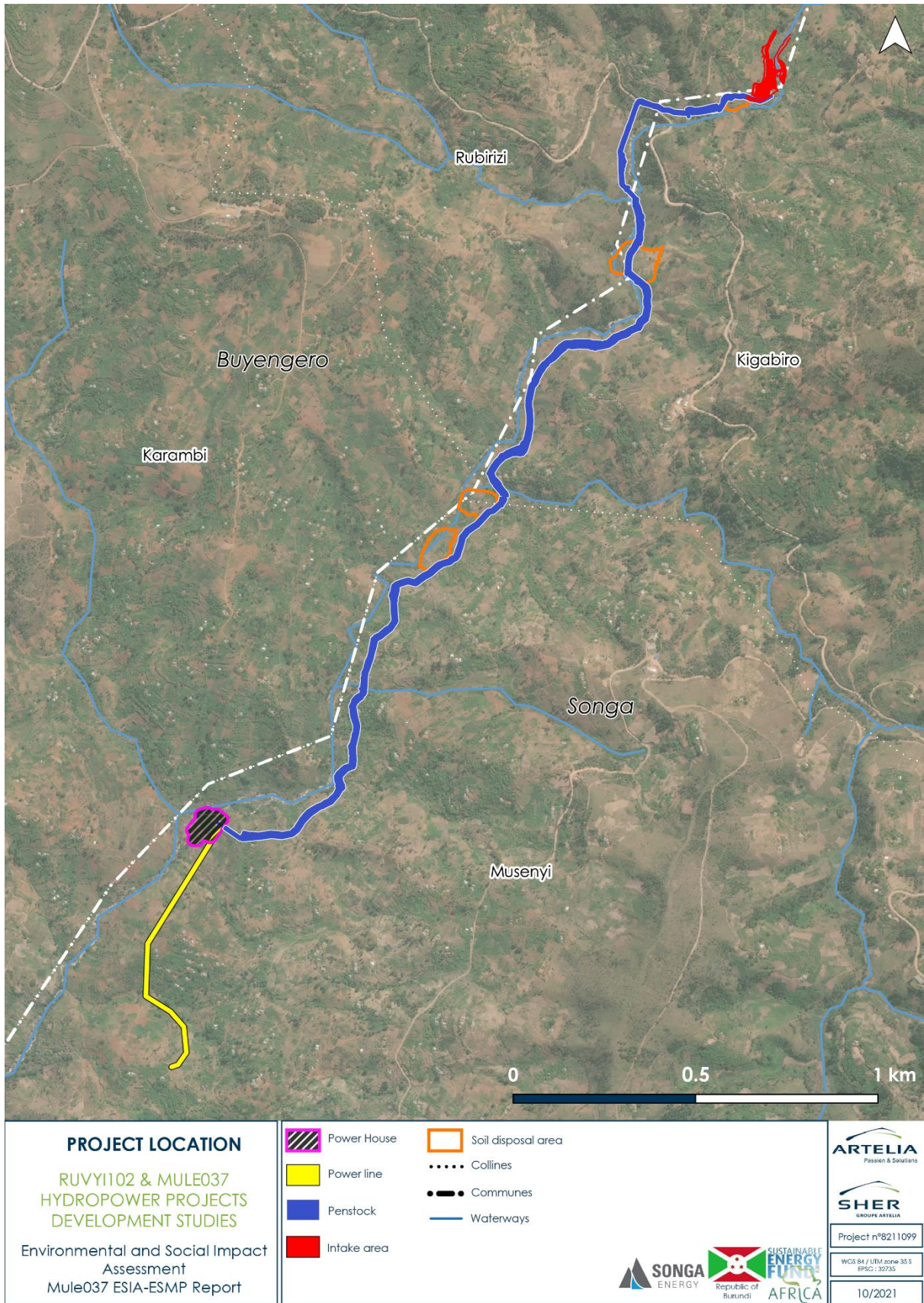
¹ Plan national de développement du Burundi (PND) 2018-2027

- 2,867.5 m of buried steel welded pipe, including 1,429.5 m of diameter DN1800 and 1,438 m of DN1600;
- The penstock crosses the river from the right to left bank with of a steel bridge;
- Two branches, of buried steel welded pipe, diameter DN1200, length 33.5 m, to convey the water to the two turbines.
- Powerhouse area:
 - Area of 320 m² on left bank of the river including
 - Transformer area and diesel generator next to the powerhouse.
- Interface with the on-going Jiji – Mulembwe hydropower plant (Mule034):
 - Power house area is about 50 m upstream of Jiji-Mulembwe access road to Mule034 intake and clear from backwaters and sedimentation caused by the Mule034 weir during the 10,000-year return flood.

The waterway will join the powerhouse and the tailrace, located downstream on the left riverbank. All features will be supervised by a control and monitoring system.

This project will also include:

- A new access road of 1.1 km to access the intake area.
- A 0.78 km long grid interconnection of 30 kV line, to bring the produced electricity to the national grid.
- Temporary infrastructures which include borrow area and quarry, temporary diversion and building sites facilities.



Location of the different components of the project

DESCRIPTION OF THE PROJECT ENVIRONMENT

Physical environment

The climate in the study area is characterized by an alternation of two seasons: a rainy season which generally extends from October to April, and a dry season from May to September. However, some effects of climate change have already been felt by exceptional rainfall and prolonged drought period which have impacted the populations and the environment.

The region is characterized by altitudes between 773 and 2,670 m. The project will be implemented in the valley of the Mulembwe River at an altitude of 1,650m. The site is bordered by two mountains culminating at more than 2,000 m of altitude. The valley is deep and the banks of the river are very steep.



Mulembwe River and its steep banks

The geology of the area is characterized by pegmatitic rocks. Pegmatite, granite, gness and quartz were found during the site visit of the project. The soil is considered as clayey on the project area. Two regional faults are indicated on the geological map of Bururi. These two faults cross the project valley upstream of the weir.

The Mule037 Hydropower Project is located on the Mulembwe River where the upstream catchments are located in mountain regions. The catchment area is part of the Congo watershed along the border dividing the major Nile and Congo basins. Mulembwe River flows southward to reach Lake Tanganyika. The Mulembwe River, in the study area is marked by a succession of rapid sections (more or less steep), with some relatively calm flow sections. The areas of rapids are accompanied by outcropping bedrock and boulders. Slopes on both riverbanks valleys are overall steep, especially along the rapid section. In the study area, the Mulembwe River also features an underground section of a few hundred meters.



Rapid sections in the Mulembwe River

The Mulembwe River is a permanent river with an annual average flow of 5.5 m³/s. The difference of flow throughout the year is marked. During the dry season from May to September; the minimum average streamflow is 2.9 m³/s. The wet season from October to April is marked by high flows with a maximum average streamflow of 8.9 m³/s in April. The streamflow of the Mulembwe River at the Mule037 Hydroelectric Project is less than 4.7 m³/s 50% of the time and that it is higher than 9.5 m³/s only 10% of the time (over a year period). The flow guaranteed 90% of the time (329 days per year on average) is estimated at 2.5 m³/s.

Water samples were taken from the Mulembwe River in order to have a baseline water quality in the study area.

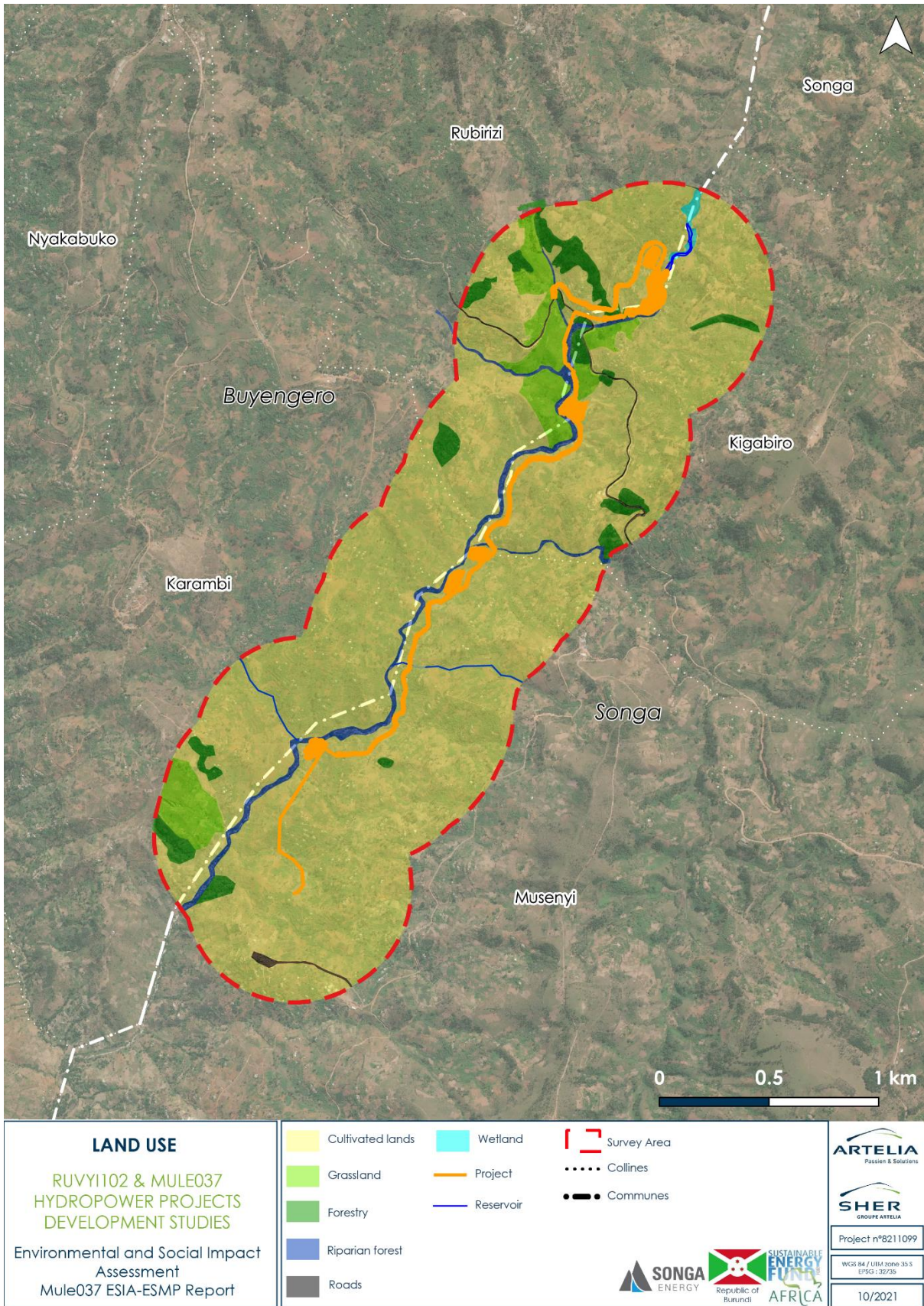
Biological environment

Biodiversity in the study area is globally low due to strong anthropogenic and agricultural pressures. The project does not impact any protected areas. The nearest protected areas are the Karera falls and the Bururi Forest Nature Reserve which are located at around 30 km respectively at the south-east and south-west from the project site.

The riparian forest gallery and the torriental Mulembwe River are the main original habitats in the study area. However, the riparian forest was largely destroyed by agriculture. Moreover, most of other habitats of the study area (cropland, forestry, grassland) can be considered as degraded habitats due to the significant human activity around the river (deforestation, farming on the banks, morphologic alteration with agriculture, bushfires, etc.). Indeed, the Mulembwe site is heavily impacted by agriculture that extends to the water's edge.

Regarding terrestrial fauna, the study areas hosts common species with a large spectrum of habitats. Large wild animals have practically disappeared because of the lack of favorable habitats, tranquility and hunting. There is also no endemic and/or migratory bird species.

About freshwater species, only two fish species were caught during the surveys but the results of previous surveys highlighted the presence of 5 species in the Mulembwe River. One of the specimens caught during the surveys belongs to *Amphilius* genus but the coloration of the specimen sampled differs from that of *A. Uranoscopus* and known specimens from the Rusizi watershed under the designation of *A. kivuensis* (Rusizi River being the closest related river in terms of hydrology). Additional measures were therefore included in this ESIA to ensure a better identification of the species and confirm its conservation status.



Land use in the project area

Social environment

The **local governance system** is based on decentralized institutions: the communes and the collines. The communes have under their responsibility several public services including, water and sanitation, health, public security, and education. Communes are also in charge of land management. If communes have technical staffs, they however lack financial services to invest in public services. The collines represent the smallest governance level in the country. Colline councils are in charge of managing everyday affairs on their territory. Women and young people are usually excluded from local governance bodies and decision process although it is noted that the current chef de colline around the intake is a woman.

Natural resources management are a crucial component in the area, since the predominant livelihood strategy remains heavily dependent on land (87% of the study area is composed of cultivated lands and 90% of the country's population relies on agriculture). Therefore, land is a source of economic vulnerability and generates recurrent conflicts (Artelia field surveys, 2020).

Water management is planned according to various strategic plans, among which the National Water Policy and the National Water Strategy are the most important. Both of them recognized the need for an integrated approach to water management, taking into consideration the different users and types of use. At local level, water use is planned within the Communal Development Plans (PCDC), no equivalent of Water Resource Users Associations have been identified.

The **management of forest** is also sensitive, as the country has known a steady diminution of forest areas for more than a century due to continuous encroachment for agriculture. In addition, the Burundian population remains strongly dependent on wood as the main source of domestic energy.

According to local authorities, the population of the study area is tending to increase, mainly due to natural growth. 81% of the inhabitants were born in the province in which they currently live. At the national scale, the population is **very young**, with nearly one in two Burundians (49%) under the age of 15. The inhabitants of the study area are mainly **Christian**.

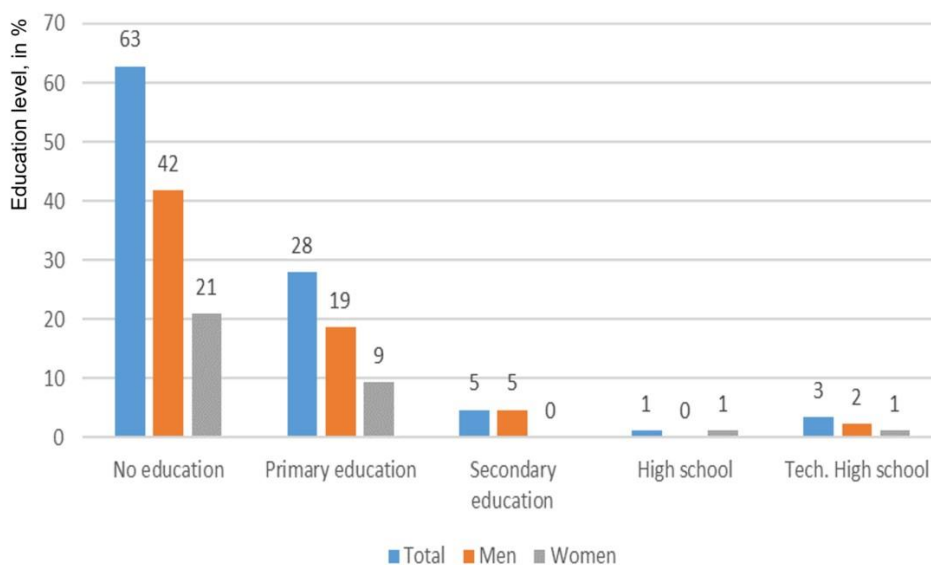
Family and social relationships appear to be generally good in the study area. However, important gender issues exist within households, notably domestic violence and the sexual division of labor. Moreover, unwanted teenage pregnancies are a serious issue in the study area.

In Burundi, the **living conditions and housing** are characterized by poverty: more than two thirds of the population live below the poverty line and 39% are in extreme poverty (World Bank, 2016). In the study area, housing is dispersed on the hillsides with limited dense settlements. The walls of the houses are almost always made of brick, while the roofs are mainly made of metal sheets. The equipment inside the house is very modest.



Dwelling with a metal sheet roof and grass-thatched roof in the foreground

Regarding **education**, Burundi has made significant efforts to increase access to primary education. Since 2005, primary school fees have been free of charge to all Burundian nationals. In general, children have easy access to primary education facilities regardless of their area of residence: even in rural areas, nearly 9 out of 10 children are close to a school. In the study area, children have quite easy access to primary education facilities: in the proximity of the project, there are two primary schools in Kigabiro and 3 in Musenyi. 75% of the inhabitants living in the study area believe that it is easy to send their children to school in both communes.



Gender disparities in education access (national level data, World Bank 2019)

The main **health problems** affecting the population in the study area are: malaria, eye problems, respiratory problems, intestinal disorders and parasitic diseases. Regarding HIV, which is a relatively taboo subject locally, awareness campaigns and incentives for HIV testing are organized. Moreover, 82% of respondents in the study area rate their health as good.

Food security is a crucial issue in Burundi. Rural households are very dependent on their agricultural production and these are very sensitive to changes. However, households have adopted strategies to reduce risks (notably polyculture) and no famine events have been reported in the study area in the past five years. In general, food diversity is good but accessibility depends on weather conditions. On average, study area residents consume

3.1 meals per day in the most favorable periods and 2 meals per day in the least favorable periods usually from October to December.

The study area does not suffer from **insecurity**, although some problems may occur locally. The main fatal accidents in Burundi are related to traffic and natural disasters (drowning cases during rainy period or traffic accidents). Drug use is not a large-scale problem in Burundi and cases appear to be very rare in the communes of the study area. Prostitution is not common in the study area but exists.

Security in the study area is ensured by the police and by the **Joint Human Security Committees (JHSC)**. In form, the JHSC include all sections of the population (Collines chiefs, zones chiefs, communal administrations, defense and security forces, magistrates, civil society associations, ex-combatants, etc.) and thus theoretically constitute ideal local actors capable of preventing insecurity.

Water quality is considered good by the population and local authorities, but access to improved water sources is uneven across the collines. However, 94% of the population in the study area consider that access to water is easy.

In rural areas, only 2% of the Burundians have access to **electricity**. The study area is not connected to the electricity grid although a few households in Mahonda are connected. Households in the study area do not have generators. Only 16% of the households have a solar panel with no significant difference between the two communes. The vast majority of the inhabitants in the study area use battery-powered lamps (100%).

Regarding **transport**, the motorcycle is the current means of transport for populations on long and short journeys. Several private vehicles (probox) are also used as public means of transport. In the study area, only 13% of households own a bicycle and none a motorcycle.

Livelihood in the study area remains strongly dependent on land use, as agriculture is the main source of revenues for most families. Hence, 98% of households surveyed declared that agriculture was their main economic activity.

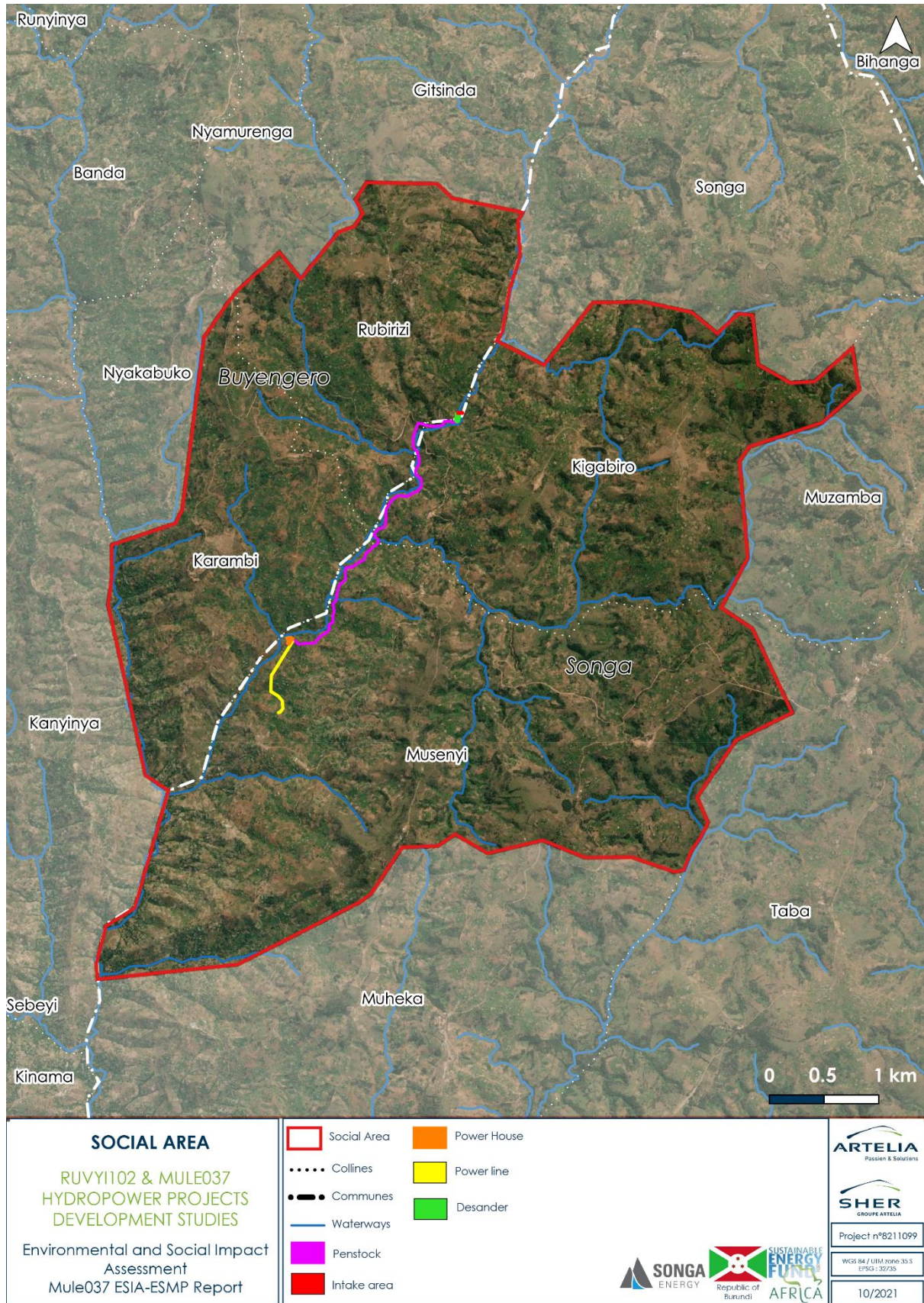
Livestock raising is widespread throughout the area. Several types of livestock can be encountered in the area, including goats, cattle, small livestock (rabbits and guinea pigs) and chickens. Livestock are an important asset for the local agrarian system. Apart from providing proteins, they also ensure fertilization of cultivated lands. Moreover, 86% of households practice livestock breeding.

Timber production represents a noticeable activity in the study area. There are several scattered areas dedicated to woodlands. In addition, many farmers have few trees on their plots. Most woodlands are communal forestry on which customary rights apply.

Several other income generating activities have been observed in the study area. Those activities are marginal compared to farming activities. They include, by order of importance, trade and Non-Timber Forestry Products (NFTPs).

Regarding **cultural heritage**, beliefs and traditions in the study area are strongly influenced by the Christian religion. In addition, despite the influence of Christianity, local communities still rely on a traditional belief system involving "spirits". However, no specific site of cultural importance is located within the study area, apart from religious buildings (church).

The study area has several **groups with vulnerabilities**: women, elderly, youth, children, people with disabilities and landless people. The challenges are particularly high for women and the elderly.



Map of the collines impacted by the project

POTENTIAL IMPACTS AND MITIGATION MEASURES**Impacts and measures linked to the project location**

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING ENM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
PHYSICAL ENVIRONMENT					
All components	The entire analysis of impacts on the physical environment (hydrological impact, impact on water quality, impact on sedimentary transport and GHG emissions) was grouped under the sections of the impacts related to the construction and operation activities.	/	/	/	/
BIOLOGICAL ENVIRONMENT					
Modified habitat	Definitive loss linked to the project footprint has a low impact on modified habitats which have a wide distribution in Burundi (cropland for example).	Low	A large part of habitats are modified habitats because of human activities. However, mitigation measures were proposed during the design phase:	Low	/
Natural habitat	Definitive loss linked to the project footprint (Torrential river and humid forest gallery). The waterways/penstock, including buffer) are located away (30/40m) from the forest gallery along most of their route.	Low	<ul style="list-style-type: none"> ▪ Establishment of main infrastructures (access road, penstock, electric line) in modified or altered habitats with lower biodiversity issues (cropland, grassland) (RM); ▪ Avoidance of the riparian forest gallery along the river (degraded but natural habitat) (AM). ▪ Compensation for lost forest gallery (0.86 ha) with implementation of a tree planting program using native species present in the area (CM). 	Low	/
Flora	Direct destruction linked to the project footprint	Low	No specific measure as mainly common species used by the local population, no protected species or listed as EN or CR on the IUCN red list and no endemic species.	Low	/
Terrestrial species including mammals, birds, reptiles,	Direct destruction or habitat alteration linked to the project footprint	Low	No specific measures as mainly common species none of them being listed as EN or CR on the IUCN red list, no endemic and no migratory species.	Low	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
amphibians and invertebrates					
Fish	Direct destruction or habitat alteration linked to the project footprint	Low	A choice of a low-rise weir (low footprint in the river) (RM)	Low	/
SOCIAL ENVIRONMENT					
Land management	By reducing the available land (through the acquisition of land within the project rights-of-way), the project will increase land pressure and may tend to increase land conflicts.	Low	The E&S Coordination Committee should include members of the Colline Councils (and in particular persons already involved in land management, such as the “Bashingantahe”), to prevent conflicts and help their resolution if they occur (RM).	Low	/
Housing	Four houses are located within the existing project rights-of-way and could therefore be affected by the project. The number of houses potentially affected is not high, but an impact on housing can be very damaging for the households concerned.	Significant	The MC should be able to avoid all of these homes, by adjusting the final layout. Therefore, the four houses located near the current rights-of-way can and must be avoided (AM). On this basis, displacement will be limited to economic displacement without physical displacement. If these houses cannot be avoided, a Resettlement Action Plan will have to be developed.	No residual impact if avoidance possible Significant if relocation needed	/
Livelihoods and economic activities	The Project location will lead to two main types of impacts on livelihoods and economic activities (potential numbers): - Loss of land, related to the acquisition of the footprint of all facilities except the power line, and the safety perimeters and buffer associated with these facilities. A total of 16.6 ha of land will be lost. - Restriction of land use, related to the construction of the power line. A total of 1.12 ha of land will be subject to the following land use restriction: (i) construction will be	Important	Some measures have already been taken to avoid and minimise this impact as part of the project design, particularly with regard to the route of the power line. However, it is important to add an additional mitigation measure: modifying the design of the project by raising the height of the line (RM). This measure will significantly reduce the impact on perennial crops (and to a lesser extent on trees with economic value). In particular, this would greatly reduce the impact of the project on banana cultivation, which represents both a source of income and food security for the inhabitants of the study area.	Significant	To manage economic displacement, a Land Acquisition and Livelihoods Restoration Plan (LALRP) will be established (CM) and will give exact details. Particular attention should be paid to gender issues and vulnerable households.

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
	prohibited under the line and (ii) trees and crops going above 3 meters (such as banana trees, mango and avocado trees as well as eucalyptus) will be prohibited under the line. It is noted that most of the land impacted by the restriction is cropland and that low crops will be allowed under the line.		This will help to decrease the impact, but the impact will still be substantial.		
Cultural and archeological heritage	The project rights-of-way will have several potential impacts on cultural and archaeological heritage: - Local communities still rely on a traditional belief system involving "spirits", which reside mainly in the forests and the river. Through its rights-of-way, the project could disturb these spirits. - The project rights of way could affect isolated graves. This is particularly the case in the vicinity of the river, where people who have drowned are regularly buried. - Although there is little evidence for the presence of archaeological remains, it is possible that the project's right-of-way will be located on land containing archaeological remains, and will therefore affect this heritage.	Significant	For the management of the impact on cultural heritage, the measures to be put in place are the following: - Regarding the impact on spirits: organise appropriate ceremonies, if necessary, to appease the spirits residing in the affected areas. This activity should be defined and organised in close collaboration with the local authorities and E&S Coordination Committee (RM). - Regarding the impact on isolated graves: precisely identify all graves located within the project rights-of-way. Then: (i) the MC should avoid affecting graves as much as possible (AM), by adjusting the final design; and (ii) in the event that certain graves cannot be avoided, their relocation should be ensured in accordance with local customs and traditions (RM).	Low	/

Impacts and measures during the construction phase

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE :	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
PHYSICAL ENVIRONMENT					
Air pollution and dust	<ul style="list-style-type: none"> ▪ Air quality degradation with engines / smoke emissions due to green waste burning ▪ Dust is generated on site due clearance of the project area (bare soil), earthmoving operations, storage of excavated materials and products, material crushing units and the concrete plant 	Significant	<ul style="list-style-type: none"> ▪ Regular control and maintenance of construction gears and trucks (RM) ▪ Limitation of clearing around the river (AM). The quantity of bare soil and green waste will therefore be very limited ▪ Reuse, composting and reclamation of waste, including green waste (RM), minimizing the burning of green waste ▪ Limit the speed of vehicles (RM) for example to 30 km/h in all inhabited areas and if necessary (complaints) regular watering of the most sensitive sections ▪ Inform local populations of work activities (IM) ▪ The monitoring of atmospheric and dust emissions will be done through the grievance register and observation of road edges (MM) 	Low	/
Noise	Noise disturbances due to the presence of many gears, engines and workers around the river and cropland areas for several weeks to several months as well as peculiar works activities such as excavation using explosives.	Significant	<ul style="list-style-type: none"> ▪ Regular control and maintenance of construction gears and trucks (RM) ▪ Limit the speed of vehicles (MR) ▪ Respect of IFC EHSGs noise thresholds limits (RM) ▪ Setting standards for the supply of personal protective equipment (PPE) (RM) ▪ Short Alert Procedure and strict explosives storage and handling procedure (RM) and Inform local populations of work activities (IM) ▪ Monitoring of noise disturbances (MM) 	Low	/
Soil erosion	<ul style="list-style-type: none"> ▪ Damage to soil conservation/reconstitution ▪ Change of physical quality of surface waters 	Important	<ul style="list-style-type: none"> ▪ Conservation of a strip of vegetation (10m) around the Mulembwe to stop and/or slowdown sediments before arriving in the river (AM) ▪ Sediment trap (RM) ▪ Optimization of Cuts-Fills (RM) 	Low	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE : AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
			<ul style="list-style-type: none"> ▪ Installation of drainage and sedimentation systems (RM) ▪ Establishment of a monitoring procedure of sediment and erosion control (MM) ▪ Material deposit areas management (RM) ▪ Implement stream crossing devices (RM) 		
Water quality	Activities related to the construction might deteriorate the quality of the surface as well as groundwater. Accidental spill of waster water / hydrocarbons or solvents into the Mulembwe could affect the water quality.	Significant	<ul style="list-style-type: none"> ▪ Implementation of a waste water treatment system (RM) ▪ Implementation of a waste collection, monitoring and treatment program (RM) ▪ Identify oil storage areas (RM) ▪ Storage of chemicals on appropriate areas (RM) ▪ Identify material deposition sites (RM) ▪ Machinery and equipment maintenance area (RM) ▪ Define strict procedures for the filling of tanks of vehicles (RM) ▪ Prevention of toxic pollution (RM) ▪ Exclusive use of authorized pesticides in Burundi and/or recognized by WHO (RM) ▪ Implementation of a monitoring plan of water from construction site quality (MM) 	Low	/
Waste production	Large quantities of waste will be generated by construction activities with indirect impact on physical environment (groundwater quality, surface water, soil, air and risk of disease vectors)	Significant	<ul style="list-style-type: none"> ▪ Development and implementation of an adapted waste management plan (RM) included specific measures about domestic, construction and hazardous wastes 	Low	/
BIOLOGICAL ENVIRONMENT					

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE :	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
Terrestrial biodiversity	Main impacts on fauna and flora species are related to: <ul style="list-style-type: none"> ▪ Clearing operations in the project footprint ▪ Accidental or unintentional introduction or propagation of invasive alien species ▪ Noise nuisance from construction activities and the operation of machinery ▪ Non-compliance with planned project footprint ▪ Extendend working hours or working at night impact nocturnal faunal species ▪ Potential increase of hunting/fishing pressure due to the increase of people around the site (indirect impact) 	Significant to Low	AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT <ul style="list-style-type: none"> ▪ Work planning to consider ecological issues and sensitivities (AM). ▪ Protection and access (RM) ▪ Maintain water quality (RM) ▪ Appropriate management of construction works in the river bed of the Mulembwe (RM) ▪ Flora invasive species management (RM) ▪ Worker training session (TM) and staff and social influx management (RM). ▪ Awareness of local communities and sensitization on ecological issues (TM) 	Low	/
Aquatic biodiversity	<ul style="list-style-type: none"> ▪ Degradation of physico-chemical parameters (hydrology, water quality) ▪ Potential bad site management practices during construction phase (waste treatment, waste management, erosion and sediment control) 	Significant	<ul style="list-style-type: none"> ▪ Awareness of local communities and sensitization on ecological issues (TM) 	Low	/
SOCIAL ENVIRONMENT					
Community infrastructures	Partial discupction of the traffic. In order to carry out the construction work, the MC will: (i) rehabilitate and widen some existing roads, (ii) create new paths (access roads) and (iii) create one or several bridges to be located during LALRP implementation.	Low	The MC should keep disruption to road traffic to a minimum (RM).	Low	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE : AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
Livelihoods and economic activities	<p>During the construction phase, the main impact of the project on economic activities will be the degradation of crops by the power line and penstock works. This impact will occur in two main ways:</p> <ul style="list-style-type: none"> - By the creation of small access roads in some places which could encroach on agricultural land. - By the works themselves for the installation of the pylon and running of the cable, which will cause temporary damage to the agricultural land crossed: trampling of plants and soil compaction by the passage of the machines. 	Significant	<p>The MC will need to avoid and minimize this impact by adjusting the final layout and identifying suitable access routes (AM / RM). However, it is expected that all damage can not be avoided and that crops/land of some households will be damaged.</p>	Significant	<p>To manage economic displacement, a Land Acquisition and Livelihoods Restoration Plan (LALRP) will be established (CM). This plan should include a clear compensation procedure for damage to agricultural land and crops caused by the power line works.</p>
Employment and local entrepreneurship	<p>Risk of conflicts related to employment, due to: (i) certain characteristics of the inhabitants that may not favour their employability, (ii) potential monopolisation of jobs by certain dominant social groups, (iii) potential difficulties in distributing jobs fairly among the different collines, (iv) potential favouritism by local authorities towards young Imbonerakure serving the ruling party, and (v) potential tensions within households arising from men's enrichment.</p> <p>Risk of conflicts related to subcontracting, because of potential discrepancies between the needs of the MC and the expectations of local businesses.</p> <p>Risk of creating dependency of employees on wage labour and cash income for their subsistence, which could lead to possible economic difficulties in case of abandonment or neglect of agricultural activities during the works.</p> <p>Risk of increased workload for women, if men are employed by the project.</p>	Significant	<ul style="list-style-type: none"> ▪ In order for job creation to have a truly positive impact, without conflict or adverse impacts, a relevant recruitment strategy should be put in place (RM/EnM). ▪ In order for local subcontracting to have a truly positive impact, a relevant local subcontracting strategy should be implemented (RM/EnM). ▪ Implement a workers grievance mechanism including specific activities for gender issues 	Positive	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE :	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
Local demography	<p>Population may grow due to (i) the arrival of workers, (ii) the return of former inhabitants and (iii) voluntary and spontaneous migrations that the project may generate during the construction phase. Several factors make the Mulembwe project favourable to spontaneous migration, but these influxes are expected to be moderate due to the small scale of the project and the limited employment opportunities offered.</p> <p>This increase in the local population can have both positive and negative impacts on the environment and local socio-economic dynamics:</p> <ul style="list-style-type: none"> ▪ Positive impacts: the presence of workers and new settlers will generate monetary flows that will partly feed the local economy (e.g. of migrants spending their income locally) and contribute to the creation of new economic opportunities and outlets that will encourage the opening of businesses. ▪ Negative impacts: even a temporary increase in population size in the collines of the study area could have repercussions on several components of the human environment. In particular: (i) the presence of mainly male workers and migrants could disrupt family cohesion (infidelity, violence against women within the family) and aggravate the issue of unwanted pregnancies of young women, which is a crucial issue at present; (ii) population growth could lead to a deterioration in the health status of the population through overloading of the health infrastructure and a proliferation of communicable diseases; and (iii) population growth could lead to land speculation as well as pressure on natural resources and inflationary 	Important	<p>AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT</p> <p>MITIGATION MEASURE :</p> <ul style="list-style-type: none"> ▪ The first measure to be put in place is to limit the growth of the population, by preparing an Influx Management Plan (RM). ▪ Additional measures can be put in place to avoid, reduce and monitor potential negative impacts that could result from an increase in the population: <ul style="list-style-type: none"> - Awareness-raising activities will be carried out on the subject of unwanted pregnancies, in partnership with a local NGO (TM). - Ensure free and anonymous access to contraception (AM) for local women (condoms but also implants) and for site workers (condoms). Information should be transmitted directly to young women in the study area (TM). - Monitoring of the use of health centres in the vicinity of the study area. If the thresholds are exceeded, put in place support measures for the health centres (reinforcement of medical staff, equipment, etc.) (MM). - The E&S Coordination Committee should include persons already involved in land management, such as the "Bashingantahe", to prevent land conflicts (RM). - Regularly (every 3 months) monitor the prices of a selection of mainly (but not only) food items in local markets in order to anticipate inflationary effects that might be caused by the project (MM). 	Positive	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE : AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING ENM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
	phenomena, while food security is a crucial issue in the study area.				
Community health and safety	<p>Impacts on the health of communities are mainly related to:</p> <ul style="list-style-type: none"> ▪ The proliferation of communicable diseases. ▪ The overcrowding of the health infrastructure, caused by the care of workers and/or migrants seeking employment. <p>Impacts on community safety are mainly related to:</p> <ul style="list-style-type: none"> ▪ Increase of road traffic which will increase the risk of traffic accidents. ▪ Illegal intrusion by individuals on the site, which could affect their safety. 	Important	<ul style="list-style-type: none"> ▪ A Community Health and Safety Plan will have to be developed and deployed to reduce the health and safety risks on local residents, to: ▪ Support the good health of the population, through: (i) the implementation of a malaria prevention and control programme in the collines of the study area and (ii) a programme to prevent and combat the transmission of STDs and HIV/AIDS targeting local residents, in partnership with a specialised local NGO. ▪ Securing site activities and facilities, while respecting human rights. ▪ This Community Health and Safety Plan will be complementary to the Influx management plan, the Occupational health and safety plan, and the Traffic management plan. 	Low	/
Workers health and safety	<p>Impacts on the health of workers are mainly related to the proliferation of communicable diseases and exposure to dust and noise.</p> <p>Risks for workers safety related to construction activities: transport accidents, traumatic accidents, musculoskeletal disorders and poisoning or burns to the skin or eyes. This construction work can lead to death or serious injury, especially when working conditions are not optimal. This impact depends on the level of training of the workers, their supervision and the application of safety rules.</p> <p>Risk of Gender-Based Violence and Harassment (GBVH) among workers (any owners, managers, supervisors or co-workers), such as: (i) sexual exploitation, abuse and harassment, (ii) violence and</p>	Important	<ul style="list-style-type: none"> ▪ In general, the PO will ensure that the MC and its subcontractors comply with the national regulations and ILO conventions to which Burundi is a signatory. ▪ An Occupational Health and Safety Plan will have to be developed and deployed to reduce the health and safety risks on workers, in order to: <ul style="list-style-type: none"> - Protect the health of employees. - Ensure healthy living conditions for the employees at the base camp. - Ensure the safety of employees at work. - Prevent GBVH. ▪ In addition, a Traffic Management Plan will also need to be prepared and implemented, based on the IOGP road safety rules. 	Low	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE :	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
	harassment that is physical and/or psychological, and (iii) financial abuse.				
Cultural and archeological heritage	Unknown archaeological remains could be destroyed during the works, in particular during earthmoving and excavation activities. (Although there is no evidence for the presence of archaeological remains in the study area, the paucity of research in Burundi should lead to caution)	Significant	<p>AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING ENM = ENHANCEMENT</p> <ul style="list-style-type: none"> Create awareness among workers about the existence of potential archaeological artefacts in the ground to be stripped and on the procedures for reporting discoveries to supervisory staff (TM). Implement a Chance Find Procedure during earthworks and excavations and require subcontractors to comply with this procedure as part of their contract. 	Low	/

Impacts and measures during the operation phase

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE:	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
PHYSICAL ENVIRONMENT					
Climate change	Mule037 is considered to be a low-emission power plant and will participate to the reduction of the national carbon emission factor of the electricity mix. Moreover, it will help reducing the dependence to forest and fuel.	Positive	No specific measure on this topic	Positive	/
Hydrology	Modification upstream of the weir (low water period and flood period). Water level will rise by a maximum of 1.93 m to create a small reservoir.	Low	/	Low	/
	Hydrological modifications downstream of the weir which will create a dry section between the weir and the powerhouse	Important	<ul style="list-style-type: none"> Optimization of the flood and trip management, in order to limit project impact on flow seasonality and to limit project impact on small flood event (RM) 	Significant	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
			<ul style="list-style-type: none"> ▪ Implementation of an Environmental flow (RM) in the by-passed section throughout the year 		
Sedimentation	Accumulation of sediment upstream of the weir and alteration of solid transport	Significant	<ul style="list-style-type: none"> ▪ Construction of a powerful flush valve to limit sedimentation upstream of the weir (RM) 	Low	/
Waste production	Waste generation by the operation phase (significantly less than during the construction phase). Risk of water and soil pollution in case of accidental spills.	Low	<ul style="list-style-type: none"> ▪ Development and implementation of an adapted waste management plan (RM) 	Low	/
Maintenance activities	Direct impact on physical environment	Significant	<ul style="list-style-type: none"> ▪ Development and implementation of a corridor and access maintenance procedure (RM) ▪ Maintain/promote an herbaceous layer or low crops in the electric line corridor, to minimize maintenance and soil erosion (RM) 	Low	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
BIOLOGICAL ENVIRONMENT					
Fish	<ul style="list-style-type: none"> ▪ Modifications/degradation of physical parameters (hydrology, water quality) negatively impacting aquatic ecosystems ▪ Lateral discontinuity in the by-passed section ▪ Fish entrainment and related mortality during the operation of the turbines ▪ Increased fishing pressure 	<p style="text-align: center;">Important</p> <p style="text-align: center;">Significant</p> <p style="text-align: center;">Low</p> <p style="text-align: center;">Low</p>	<ul style="list-style-type: none"> ▪ Environmental flow (RM) in the by-passed section in order to maintain aquatic ecosystems during the dry season ▪ Carry out detailed identification of <i>Amphilius</i> sp. and if necessary, a study about its ecology (EnM) at the scale of the Mulembwe watershed and its distribution. If this species has the potential to trigger a critical habitat, conduct a critical habitat assessment. If a critical habitat is triggered, develop and implement a net-gain strategy. ▪ Specific monitoring of fish population upstream and downstream the weir, including the section between the weir and the underground section (MM) during the first five years of the operation phase. 	Low	<p style="text-align: center;"><i>Should identification of the species of <i>Amphilius</i> sp. lead to the trigger of a critical habitat, develop a specific BAP to target biodiversity net gain (conceivable as the negative impact of the project is low)</i></p>
Terrestrial fauna	Risk of in-flight collision for birds with the electric line	Low	<ul style="list-style-type: none"> ▪ Use of various bird protection devices (RM) 	Low	/
SOCIAL ENVIRONMENT					
Community infrastructures	As part of its work, the MC will (i) rehabilitate and widen some existing roads and (ii) create new paths (access roads). This potential impact is positive. However, local communities and their leaders expect a broader support in terms of access to basic services. This could lead to tensions between the local population, the local authorities and the project.	Significant	<p>To make the impact on community infrastructure positive:</p> <ul style="list-style-type: none"> ▪ The population should be allowed to use roads (EnM). ▪ Within the framework of the SEP, the project should provide accurate information, in a transparent and clear way, on the real benefits of the project for the population (TM). 	Positive	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
Livelihoods and economic activities	The operation of the line may require maintenance activities on the pylons. The passage of machinery and the work may cause damage to land and crops.	Significant	<ul style="list-style-type: none"> Selection of the shortest routing option to minimize areas impacted by the power line (RM) 	Significant	A Land Acquisition and Livelihoods Restoration Plan (LALRP) will be established (CM). This plan should include a clear compensation procedure for damage to agricultural land and crops caused by the maintenance of the power line.
Water resources and uses	The project will have low impacts upstream of the weir and downstream of the release point. The impacts, in terms of water use, will be restricted to the dewatered segment. However, apart from agricultural activities, the river is currently used very little by the population.	Low	<ul style="list-style-type: none"> Implementation of an environmental flow (RM) (see section 8.3.1.2) 	Low	/
Employment and local entrepreneurship	<p>In the operation phase, the positive impacts in terms of employment and local subcontracting will be limited:</p> <ul style="list-style-type: none"> The operation of the plant only requires a limited number of direct employees (about 10 people), with qualified profiles (engineer level) - a level of qualification that the local communities might not meet. The monetary flows that fed the local economy during the construction phase will be reduced or even disappear with the closure of the site. This economic decline will be gradual, and its consequences may take several weeks or even months to materialise, taking the form of the closure of businesses offering goods and services to workers and migrants, the disappearance of certain markets for local agricultural production, an increase in 	Significant	<p>In order for the impact to be positive, the risks of opposition should be limited by implementing the following measures:</p> <ul style="list-style-type: none"> During the construction phase, anticipate the activities that can be sustained during the operation phase, in particular all the maintenance activities of the facilities. Then, determine which of the identified jobs can be reserved for local communities (RM). Within the framework of the SEP, inform PAPs about the real employment opportunities during the operation phase (TM). 	Positive	/

COMPONENT OR ACTIVITY	POTENTIAL IMPACTS	POTENTIAL IMPACT ASSESSMENT	MITIGATION MEASURE: AM = AVOIDANCE RM = REDUCTION MM = MONITORING IM = INFORMATION TM = TRAINING EnM = ENHANCEMENT	RESIDUAL IMPACT ASSESSMENT	OFFSET STRATEGY (IF NECESSARY)
	unemployment, etc. All these elements could lead to economic slump and dissatisfaction on the part of the population.				
Community health and safety	<p>During the operation phase, the project will create two types of risks to the health and safety of local communities:</p> <ul style="list-style-type: none"> - The impacts of a run-of-river hydropower project on public health are generally related to waterborne diseases. In the case of the Mule037 HPP project, the creation of a small reservoir upstream of the weir could favour the proliferation of malaria vectors. However, this reservoir will be very limited in size, as Mule037 is a run-of-river project. - The presence of operational land-based structures poses risks to the safety of people, particularly children. The structure that represents the biggest source of danger is the power line (risk of electrocution). 	Important	<p>To avoid and reduce risks to the health and safety of local residents, the following measures should be implemented:</p> <ul style="list-style-type: none"> ▪ Set up a regular epidemiological monitoring programme (MM) with the health authorities. In the event of an increase in the prevalence of water-borne diseases, measures to destroy the breeding grounds could be implemented (RM). ▪ - Install fence around the land-based structures and prohibit access to these structures (RM). ▪ - Deploy adequate signage and protective equipment at land-based structures (RM). ▪ - Carry out awareness-raising actions targeting mainly the general public (in particular children) but also municipal technical services (TM). 	Low	/

IMPACT ON ECOSYSTEM SERVICES

The analysis of the impacts of the project on ecosystem services show that some provisioning services (priority type I or type II) are present in the study area: cropland, agroforestry and Mulembwe water.

A set of measures already presented in the different themes (physical, biological and human environments) help to avoid, reduce and compensate for the impacts on provisioning, cultural, regulating and supporting ecosystem services. The measures planned for social aspects also respond to these challenges. No additional measures are proposed specifically on this topic.

CUMULATIVE IMPACTS

The Mule037 Project is one of a series of other hydropower construction projects on the Jiji and Mulembwe rivers in Bururi province. This includes Mule034 project which was launched in 2016 by the state-owned water and electricity distribution group Regideso with the World Bank. The Mule034 weir is located downstream of Mule037 powerhouse which will discharge water in the small reservoir of Mule034 project. Mule034 is the main other project and industrial infrastructure in the study area.

The main cumulative impacts will then concern several aspects:

- Both projects studied require land rights, leading to the loss of arable land, trees, plantations and even buildings for the people affected, in a context where land pressure is high.
- If the two projects have simultaneous construction periods, they could have a cumulative effect on the influx of workers in the communes concerned as well as on all the effects induced by these influxes such as the increased risk of spreading diseases. It is noted that Mule034 is currently under construction and the construction period of the two projects may be overlaid.
- The two hydropower projects on Mulembwe may increase the amount of sediment between the two projects. However, the run-off-river projects will not significantly modify the average annual mean flow rates. They will therefore have no significant impact on the hydrology of the Mulembwe downstream from the confluence.
- Both projects are expected to create temporary to permanent local jobs between the construction and operation phases, although these opportunities are expected to remain relatively limited.
- Both projects will actively participate in the development of the country through the production and distribution of electricity in the country. These projects will increase the rate of access to electricity and thus greatly improve the living conditions of the beneficiary populations and promote local development.

However, it should be noted that the impacts of the two projects are considered as additive without significant synergy and are therefore manageable through the measures proposed in the respective Environmental and Social Management Plans of the projects and do not require additional measures.

PUBLIC CONSULTATIONS

Consultations during the ESIA preparation phase took place from November 2020 to February 2022, as part of field activities. Their main objective was to inform stakeholders and to gather expectations, concerns and recommendations to improve project design.

Consultation forms were adapted to the local context, and to the different stakeholders met by the survey team. Four methods of consultation were used, according to the targeted audience:

- Meeting with local authorities and communal technical services:

List of meetings with local authorities and Communal technical services

Commune	Represented authorities	Date	Duration	Attendees
Buyengero	Communal authorities	November 27, 2020	2h07	Total : 15 No women
Songa	Communal authorities	November 18, 2020	1h25	Total: 10 (including 2 women, or 20%)
	Communal authorities	January 31, 2022	1h25	Total : 1 No women

- **Public information meetings** with the communities from the different collines, open to all and taken as a whole:

List of Public Information Meetings

Commune	Colline	Target audience	Date	Duration	Attendees
Buyengero	Karambi	Local communities	November 27, 2020	2h55	Total : 15 No women
Songa	Kigabiro	Local communities	November 18, 2020	2h36	Total: 18 (including 1 woman, or 5.5%)
Songa and Buyengero	Karambi, Kigabiro and Rubirizi	Local communities	November 19, 2020	1h37	Total: 69 (including 8 women, or 8.6%)

Low attendance of women who was invited same as men, is explained by their place in the local hierarchy and their responsibilities in household's chores (often working in the fields during the day): women's voices are usually heard within the household but they do not participate to community's decisions.

- **Key informant interviews** (KII), with resource persons such as medical staff in health centers:

List of key informant interviews and focus group discussions

Commune	KII local authorities	KII Commune technical services (agriculture & land)	KII Health centre	FGD Women	FGD Youth	FGD farmer	FGD Environment
Buyengero	x	x	x	x		x	
Songa	x	x	x	x	x	x	x

- Consultations as part of **household surveys**.

Number of household surveys per colline

Commune	Colline	Number of HH surveys	
		Gender of respondent	
		H	F
Buyengero	Karambi	30	14
	Rubirizi	1	1

Commune	Colline	Number of HH surveys	
		Gender of respondent	
		H	F
Songa	Kigabiro	12	12
	Musenyi	15	1
Total		58	28

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The objective of the ESIA is to identify potential impacts that can result from the project activities and to develop mitigation measures that are technically appropriate, financially acceptable and readily applicable in the context of the project.

The recommended measures are discussed during the consultation sessions and selected in a consensual framework. The proposed mitigation measures include preventive measures to avoid the creation of an impact, corrective measures to eliminate or reduce an impact, and compensatory measures for unavoidable impacts.

The ESIA (and its attendant complementary studies) is a planning document that provides decision-makers with the elements necessary to make a decision to commit or abandon the project. The initial state of the physical, biological and social environment is described in details, potential impacts are technically assessed and proposed mitigation measures are clearly justified.

The ESMP has a very different role. It is an operational document, which aimed to complete the analysis defining the operational context in which measures are implemented. Since the beginning of the project, the ESMP becomes the reference document for all the stakeholders, both for monitoring action programs and for conflict resolution. The ESMP is a complementary document of the ESIA, aiming to facilitate the implementation and the monitoring of the various recommended measures by the ESIA.

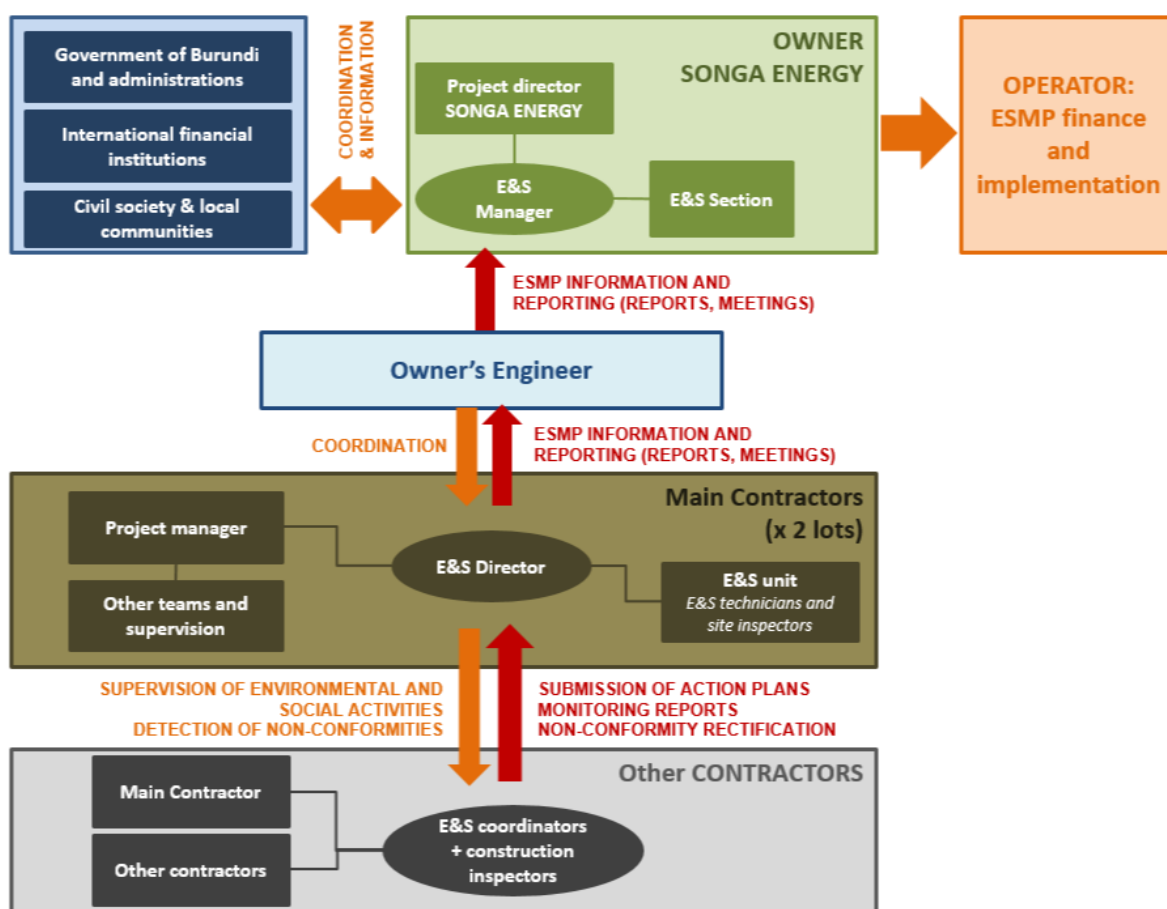
The ESMP organization is part of the overall organization that will be given to the project both during construction and operation phases. Each entity with a direct responsibility for the implementation of the project must have a responsibility for environmental and social management. At this stage, the identified entities are:

- The project owner (PO);
- The Main Contractors (MC);
- National and local authorities.

The project owner (PO), Songa Energy, will establish a call for tenders to select two Main Contractors (MC) with one lot for civil and electromechanical component and one lot for interconnection component. The selected Main Contractors will be responsible for the design and construction of the project and will therefore act as both Main Contractor and construction contractor for their respective components. It is the MC that will involve other companies on their activities, through subcontracting, for the realization of dedicated services.

The environmental and social obligations of the Main Contractors (MC) shall be included in the tender's documents at the time of the call for tenders in the form of Health, Safety, Environmental and Social (HSES) specifications. These same obligations must be included in the contract in order to have binding legal value. The diagram below presents, on the basis of the information available, the organization planned for the implementation of the ESMP.

Organization chart for the ESMP implementation



Through specific plans and procedures, the ESMP implements all the measures identified in the ESIA and which aim to preserve the integrity of the physical, biological and human environment in the Project area of influence.

For the Mule037 HPP the following plans and procedures are proposed:

Main environmental and social management procedures:

- Control procedures;
- Communication and stakeholder engagement;
- Human resources management;
- Chance find procedure;
- Land acquisition and livelihood restoration plan (LALRP);
- Environmental Monitoring Plan;
- Biodiversity Action and Monitoring plan (BAMP);
- Incident Management Procedure and emergency preparedness response plan.

Main environmental and social management plans for construction phase:

- Access management plan;
- Traffic management plan;

- Influx management plan;
- Occupational health and safety plan;
- Community health and safety plan;
- Chance Find procedure;
- Support plan for local economic activities;
- Air pollution and noise management plan ;
- Waste management plan;
- Earthwork and erosion management plan;
- Hazardous products and pollutants management plan;
- Discharge and water management plan.

Main environmental and social management plans for operation phase

- Community health and safety plan;
- Support plan for local infrastructures;
- Waste management plan;
- Hazardous products and explosives management plan.