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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) REPORT SUMMARY

FOR THE

KIGALI BULK WATER PROJECT

RWANDA

0CTOBER 2015

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

1. General Information

Project Title:	Kigali Bulk Water Project
SAP Code:	P-RW-E00-008
Country:	Rwanda
Division	OPSD3
Project Category	2

1.1 Introduction:

Rwanda is undergoing massive economic development and it is imperative to have infrastructure that can support the country's ambitions. The Government of Rwanda through Water and Sanitation Corporation (WASAC Ltd) signed a Public- Private- Partnership (PPP) water project with Metito. Metito was established in the Middle East in 1958. Metito has built more than 3,000 water desalination and wastewater treatment plants since its inception. Metito's current global project portfolio is in excess of USD 1 billion and over 2,200 employees. It provides water management solutions in emerging markets including Middle East, Africa and Asia (provided water treatment plants and desalination plants in Egypt, Sudan and Algeria).

The Project company, Kigali Water Limited, has been established in Rwanda, owned by an investment vehicle, Kigali Water Mauritius Ltd ("InvestCo") incorporated in Mauritius. The proposed Kigali Bulk Water Project Supply is designed to be a 40,000m^3/day groundwater extraction from the Nyabarongo River near Kanzenze Bridge in Kanzenze Cell of Ntarama sector, Bugesera District. This scheme comprises a wellfield, water treatment plant (WTP) and associated infrastructure (transmission lines) to convey the water to new storage reservoirs. When completed, the Kigali Bulk Water Supply Project will allow WASAC to provide safe water to communities in Kigali, Kagarama, Nyanza , Gahanga and Bugesera.

1.2 Objectives of the ESIA & ESMP:

The objective of this environment and social impact assessment and its management plan are to assess potential impacts that the proposed project may have on the environment and vice versa. Once impacts are identified the management plan will be implemented to ensure that the Kigali bulk water project is implemented in an environmentally and socially sustainable manner and in full compliance with the Organic Law N° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda and other requirements such as the AfDB's integrated safeguards system (ISS).

The ESIA process entailed (i) scoping study/ preliminary assessment, (ii) review of secondary data on baseline information, (iii) review of policies and regulations, (iv) review of previous meetings and consultations with stakeholders, (v) interviews with key stakeholders, and (vi) field surveys at the project sites including water abstraction area, water treatment plant sites, water storages sites and the route for transmission pipes. This was done to gather information and data on various aspects of the project site.

1.3 Project location and description

The proposed Kigali Bulk Project is located in Kanzenze Cell, Ntarama sector, Bugesera district while the treated water storages are located in Gahanga sector Kicukiro district and in Bugesera District, Ntarama sector.

1.4 Alternatives considered:

The selected site for water abstraction and construction of the water treatment plant as well as water storages facilities are inhabited hence no physical resettlement is expected. The site is located at Kigali-Bugesera road and it takes only 20 minutes driving from Kigali-center. The site is close the existing national electric transmission lines. Implementing the Kigali bulk water supply project has more benefits than the no project option. The project will improved health and sanitation, assist the country in achieving the vision 2020's targets; assist in the transfer of knowledge; result in improved socio-economy; result; rational exploitation of Rwandan natural resources.

The no-project option would mean present flow regime of the proposed water supply source, Nyabarongo river are maintained, no short term construction impacts, the limited possible water contamination associated to human activities within the area would not exist, absence of health risks associated with water treatment plants, but the main disadvantage of the no project option would be that the growing population of Kigali and Bugesera district will continue to suffer from acute water shortages caused by inadequate existing water supply system and a large percentage of the population living outside of the area of coverage of the existing water supply would continue having no access to safe water.

2. Context

This section provides information on the physical, biological and socio-economic elements of the environment, which shall be used as benchmarks for future monitoring. The area considered for assessment of baseline conditions span the whole Kigali bulk water project sites and their vicinity. Data were obtained as a result of literature and field surveys.

Baseline information were collected on the physical, biological, socio-economic environment was collected from a variety of sources, namely project documents and general literature review, visual and inspection, expert opinion, consultations with selected stakeholders and discussions with Kigali Project team.

2.1 Social and economic baseline data

Administratively, most of Kigali Bulk water project including water abstraction, water treatment plant and main water storages facilities are located in the Ntarama Sector, in Bugesera district and Gahanga and Kagarama of Kicukiro district.

2.1.1 Bugesera district socio-economic profile

(i) Population

The population of Bugesera district is 391,000 and about 56% are aged 19 years or younger. People aged 65 years and above make up 2.5%. About 51% of the population is made up of female individuals and the majority of the population is young, with about 84% still under 40 years of age. The average size of the household in Bugesera district (4.9) is slightly higher than the national average household size and the same as Gatsibo district in the same province.

(ii) Poverty

About 52% of the population in Bugesera district is identified as non-poor, 20% as poor (excluding extreme poor) and more than a quarter (28%) as extreme-poor.

(iii) Water and Sanitation

Improved drinking water sources include protected springs, public standpipes, water piped into dwelling/ yard, boreholes, protected wells and rainwater collection, as defined by the World Health Organization (WHO). The majority of households use a protected spring (56%), followed by other improved sources (7%) and public standpipes (5%). In Bugesera district, 29% of household's still use an unimproved drinking water, including 24% using surface water (i.e. from rivers or lakes). Bugesera district is a long way from achieving the national target for the water and sanitation sector, which is to increase access to drinking water to 85% by 2012. On average, 43% of households in Bugesera district are within 15 minutes' walking distance of an improved water source. The mean time to an improved water source in Bugesera district is 13.5 minutes, which is slightly better than the national average (14.4 minutes). The WHO/UNICEF Joint Monitoring Programme defines an 'improved sanitation facility' as flush toilets and pit latrines with a floor slab. Bugesera district has 80% of households with access to improved sanitation facilities, which is above the national average (74.4%).

(iv) Source of energy

The primary sources of energy used for lighting by households includes, electricity, oil lamp, firewood, candle, lantern, battery, and other unspecified sources. In Bugesera district, 4.3% of households use electricity as their main source of lighting.

(v) Source of income

Main components of income include agricultural income, wage income, business income, rent income, and income from transfers.

(vi) Small water supply operators

This is not a recognized activity but during the dry season where water supply is an issue, some young people who possess bicycle stake advantages of this situation and buy water far from the centers and resell the water to the people who don't have time or means of getting the water. A 20 litres recipient is bought at between 20 and 50 Rwandan francs Rwandan and sold to 120 Rwandan francs. Per day one person can make 1500 rwandan francs (2 USD).

(vii) Land and land use

The mean size of land cultivated per household in Bugesera district is 0.88 ha.

(viii) Education

Bugesera district has a literacy rate of 72.9%. At national level, the average level of literacy rate is 69.7%.

2.1.2 Kicukiro socio-economic profile

(i) Population

The total population of Kicukiro district in 2010–2011 was 301,000, representing 28% of the total population of Kigali City and 2.8% of the total population of Rwanda. Females comprised

49.8% of the population. The average size of the household is 4.7 for Kicukiro district, which is a slightly below the national average. In Kicukiro district, 92% of the population is identified as non-poor, 5.5% as poor and only 2.8% as extremely poor.

(ii) Water and sanitation

69.7% of households in Kicukiro district use an improved drinking water source. 57% of households in Kicukiro district are within 15 minutes' walking distance of an improved water source.

(iii) Housing

Kicukiro district is the first district in terms of cement flooring being the most commonly used material with 69.3%. Beaten earth comes second with 25%. Half of urban households have cement flooring, but at national level the average is only 17.1%.

(iv) Energy characteristics

In Kicukiro district, 63% of households use electricity as their main source of lighting.

(v) Economic activity

The overall Employment rate in Kicukiro district is 78% of the resident population aged 16 years and above; the unemployment rate is 4.7% and the economic inactivity rate is 18.3%.

(vi) Income source

The main income source in Kicukiro includes agricultural income, wage income, business income, rent income, and income from transfers.

(vii) Education

Kicukiro district is ranked first with 94.4% of individuals aged six and above having ever attended school.

2.2. Physical Baseline Data:

2.2.1 Hydrology

(i) Characteristics of Nyabarongo River basin

The Nyabarongo River basin is within the Rwandan Nile catchments that occupies 67% of Rwanda and drains most of the Rwandan waters into the Nile through Akagera River. Nyabarongo River basin has a catchment area of 8,900 sq km, an annual rainfall of about 1,350m and its altitude varies between 3000m upstream and 1,350m downstream. The river basin does not experience cold season, except in the Northwest part of the country where the sub catchments of the river (Mukungwa River) are situated in the volcanoes area with altitudes higher than 2, 500m. There are no marked differences in rainy and dry seasons while the special variation of rain is heterogeneous and precipitation pattern are characterized by thunderstorms, due to slowly moving humid air masses climbing against the hilly terrain. Major Nyabarongo River tributaries are Akanyaru River from North West and Mukungwa River from North in the volcanoes. Nyabugogo River is only about 10%% of the Nyabarongo River

The Kigali bulk water supply project will be located almost 10km after the confluence of Nyabarongo with Akanyaru River. There is no any other stream, dam or surface water flowing within the vicinity of the project area of intervention.

(ii) Water quality assessment at Kanzenze bridge

Water quality results from May 2015 and those conducted by the Nile basin initiative project in 2009 show that there is no evidence of degradation of surface water resources in the area.

(iii) Potential source of pollution:

The Kigali Bulk Water Project will use raw groundwater from Nyabarongo and the project is located downstream of Kigali City. Water quality assessment identified municipal waste, industrial waste and domestic water as the main sources of pollution for the Nyabarongo River. The Nyabarongo River receives inflows such as the Mwange River, Rusine River and Marenge River upstream. Around Kigali city urban area, more polluted streams (Rwanzekuma, Ruganwa, Mpazi and Yanze) join Nyabarongo River.

There is flower and sugar farming in the Nyabugogo catchment and the Kabuye Sugar Works. Rwanda has taken the water pollution and environmental pollution seriously and many initiatives were conducted to mitigate these impacts. Those initiatives include:

Relocation of Gikondo industrial park: started in May 2012 and concerns 14 heavy and light factories shifted to the Kigali Special Economic Zone (KSEZ) in Nyandungu sector, Gasabo district.

Relocation of Nyabugogo garages

Four years ago the Rwanda Environmental Management Authority (REMA) issued a notice and they have been allocated a large piece of land above Gatsata where they will build modern garages and spare parts shops.

(iv) Flood risk assessment at project area

The analyzed data are for a period of 52 years (from 1961 to 2013). The water level showed that the maximum height recorder is 5. 74 m at Ruliba station in 1998. During that period of 52 years the maximum height of water level recorded at Kanzenze is 6.06 m and was recorded during a period of 4 days (from 13 to 16/5/1979)..

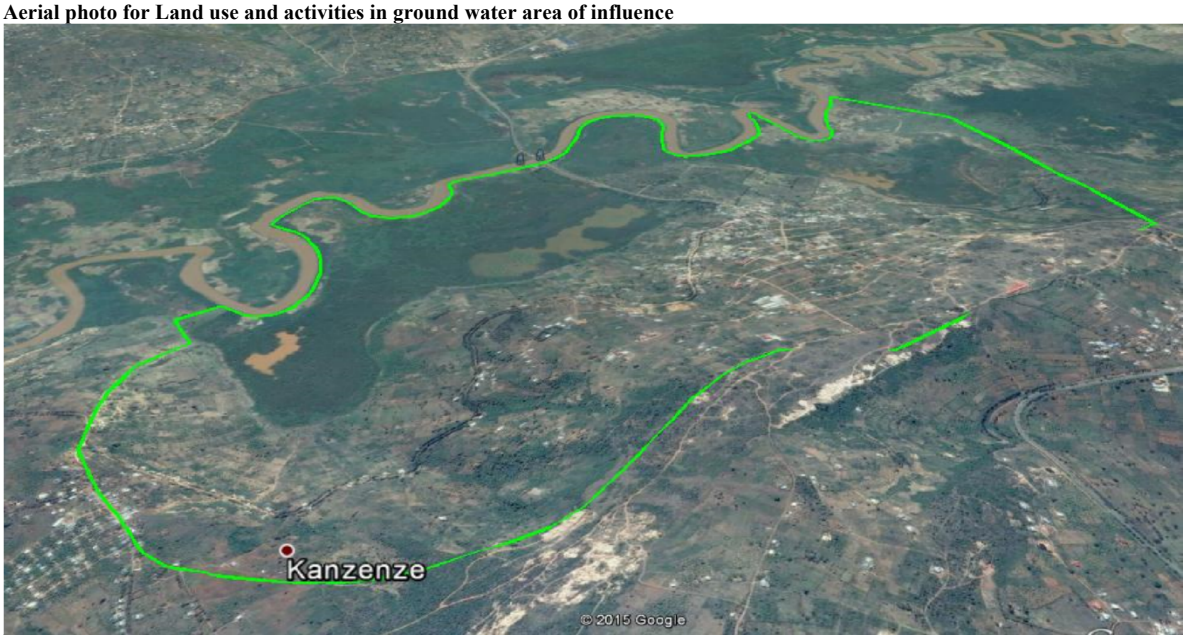
(v) Interaction between Nyabarongo River and groundwater

To demonstrate the interaction between the Nyabarongo and the aquifer a staff gauging station was installed on the right bank of River Nyabarongo in the area of piezometers made 1992. This location was chosen because of its proximity to the old piezometers and data are recorded each day. In this way, it was possible for constantly measuring the level of the river during the pumping test. The aquifer in the Nyabarongo valley reveals a good hydraulic contact with the river, which can be clearly demonstrated by the hydrograph piezometers and Nyabarongo. This suggests that the charged water comes mainly from the Nyabarongo. According to the geological survey done in feasibility study, the analysis of chemical data of pumping tests, support the idea of a good hydraulic contact between river and aquifer.

(vi) Land use and activities in the assumed groundwater influence

Most of the land is used for habitation and the remaining is the river floodplain which has animal farms (cows, pigs, and chickens). The area is under intensive sugar cane cultivation under a project of the Ministry of Agriculture supported by Netherlands Kingdom. The project is called Make Sugar Work. A factory for leather is under construction. The Figure below taken from Google earth shows the land cover in June 2015. Most of the area is covered by the villages in Kanzenze, Karumuna and the marshland near the river covered by vegetation.

Aerial photo for Land use and activities in ground water area of influence



(vii) Climatology

Kigali bulk water supply project area (Kanzenze) as well as the rest of the area of intervention (Kicukiro and Bugesera) receives high rainfall almost all year round. The region is characterized by four distinct seasons: a first rainy season from September to December, a short dry season in January followed by a long rainy season from February to May and a long dry season from June to August. The annual rainfall ranges from 1,597 – 2,873mm per year. The mean maximum temperature of the area is about 29^{o}C. The high temperatures and rainfall allow for crop development all year round, enabling farmers to have two cropping seasons.

(viii) Air pollution level in project area

The Kigali bulk water project is located in the neighbourhoods of Kigali City where the air is slightly polluted and the implementation of the project may contribute to the situation and people health. The main sources of air pollution which are man-made relate to transportation, industry, combustion fuels, industrial processes and use of pesticides.

(ix) Noise level in the project area

In Rwanda Noise pollution is determined when sound goes beyond 80 decibels but Rwanda has adopted EAC standards that sets the maximum permissible noise levels for residential areas at 60 dB (A). Noise levels were recorded at the proposed project areas and the highest was 45 decibels due to the impact from vehicles.

(x) Water availability:

The assessment of flows indicates that there is plenty of water in the Nyabarongo River to meet projected demands in Kigali, and that abstractions would be very unlikely to have significant impacts on downstream users. Groundwater storage is not static due to recharge from the surface water. The short term monitoring data for Nyabrongo River and the existing wells, shows that there is a direct contact between the river and the sandy layer, so Nyabarongo River is considered as the main supply of the water inside the aquifer. The only existing Water Supply System within the area of Kicukiro and Bugesera Districts is a WASAC Ltd but the water in the area is not sufficient hence the local residents sometimes have no water for 5 days.

(xi) Topography

The topography of project area is characterized with by a mixture of plateaus with an altitude varying between 1340 m and 1700 m and undulating hills dominated by varying heights. The groundwater influence area is located in a wetland with flat topographical characteristics whereby the altitudes vary between 1480 - 1350 AMSL. The wetland is surrounded by gentle hill with a high elevation of 1540 m (AMSL).

(xii) Soil characteristics

Alluvial and colluvial soils of marshes and valleys which comprise mineral soils and the organic soils are found in the valley of Nyabarongo. The second prevailing soil type in Kanzenze cell, especially Kanzenze Reservoirs location is sandy soil type with a low quantity of humus and is highly permeable and dry quickly after rains. The shores of the river and marshes give, in some areas, clay which is used in making bricks, tiles and traditional pottery. There are also many kinds of sand used for construction of houses.

2.3 Biological Baseline Data:

2.3.1 Biological and ecological baseline data

The Nyabarongo River Wetlands is a protected area in Rwanda, covering 142.62 km². It is located in the south-east of the country, south-east of Kigali, and includes swamps and marshes in part of the flood-plain of the Nyabarongo River, the longest river in Rwanda. The wetlands are fed by the Nyabarongo River, a tributary of the Nile, which empties into the Akagera River which, in turn, flows into Lake Victoria.

2.3.2 Swamps vegetation

The vegetation of Nyabarongo swamps is dominated by the papyrus in the zones of permanent flooded basins. The marshland's vegetation in clude a number of trees used for various things such as improvement & stabilization of soil, construction and carpentry, fuelwood and charcoal , crafts, support hives, fruits, medicinal etc.

2.3.3 Important Birds Area

Kigali Bulk water project will abstract water from Nyabarong wetland which is an important bird area Rwanda and a refuge for wetland-dependent species. It plays important roles in regulating water flow. It is home to around 26 species that were observed during the assessments and also the endangered Madagascar pond heron Ardeola idae, the Near-

threatened Papyrus Gonolek Laniarius mufumbiri, theVulnerable Grey Crowned Crane Balearica regulorum gibbericeps, and Sitatunga Tragelaphus spekii.

2.3.4 Information on terrestrial animals

The area is home to monkeys (*Cercopithecus mitis*), mice, frogs, snakes and water bodies have hippopotamus, crocodiles and a fishes.

2.3.5 Threats which act on the biodiversity of the swamp

Agricultural activities reduce the stretch of the swamp and, thus, reduce the optimum space for the survival of certain species of large territory.

3. Beneficial and Adverse Impacts

The project is expected to have both positive and negative impact. Positive environmental impacts expected from Kigali bulk water project include:

3.1 Positive Impacts

Implementing the Kigali Bulk Water Supply project will contribute to:

3.1.1 Job creation and income generation

The project will provide up to more than 1,500 Employment opportunities over its entire lifetime. It is expected that more than 95% of employment will be generated during construction phase and apart from highly qualified jobs that cannot be available on national market, the majority, more than 95% will be Rwandan and priority will be given to people from project area

3.1.2 Improved health and sanitation

The project will significantly contribute to improvement of sanitation within and in the vicinity of the project intervention and therefore improvement of living conditions.

3.1.3 Access to potable water

Once completed, Kigali Bulk Water Project will provide 40,000m^3/day and this will allow WASAC to provide safe water to communities in Kigali, Kagarama, Nyanza, Gahanga and Bugesera.

3.1.4 Knowledge transfer

Technical and planning skills will be gained by the local community members that will be employed by the project and this is likely to contribute to the capacity building within the local community and the ones who have the expertise in the technology to be introduced by the project.

3.1.5 Gender balance enhancement

In line with Rwanda labour policy, every investor/developer is required to employ at least 30% of women. Furthermore it is expected that during the project implementation women will also equally benefit as men in terms of employment benefits. In Rwandan culture, it is the responsibility of a woman to collect water and during water shortages, women and girls use most of their time for water. Therefore, with Kigali Bulk water project water will be highly beneficial to women and girls.

3.1.6 Improved local socio-economy

It expected that all works related to the project will provide a positive increase to the local and national economy in general this will contribute to the socio-economic benefits within and around the project area.

3.1.7 Increase to public revenue / taxes

The implementation of the project will increase revenue and taxes for both the central (Rwanda Revenue Authority) and local authorities. The project will fully participate in increased payments of taxes from suppliers of the clean water in Kicukiro and Bugesera Districts.

3.1.8 Rational exploitation of Rwandan natural resources

The project will contribute to the sustainable use of ground water resources and as it is the first of its kind, it will serve as a model for future involvement of private sector in water projects.

3.2 Negative impacts:

Expected adverse impacts range from physical environment impacts, biological impacts and social Impacts and include air and noise pollution, soil erosion from construction works, fire outbreaks, modification of water table flows, water pollution and loss of biodiversity at water treatment plant, wells and water storages as well along transmission lines. Social impacts include loss/sterilisation of land, trees and crops. They are listed in the table below for both construction and operational phases.

Activity	Adverse Impacts	Proposed Mitigation measures	Implementation Schedule	Responsibility	Budget ($ US)
Site installation and Site clearing for WTP & water storages	Soil erosion and contamination of water in the adjacent streams.	- All earthworks for site preparation and leveling will be carried out during the dry season of each implementation phase and the permanent storm water, road and site drainage system will be in place before the onset of the following rains.	Construction phase	Contractor	To be determined by contractor
	Loss of biodiversity	- Plantation of trees around the WTP, establishment of gardens and stabilisation of areas including borrow pits with grasses and trees.	After construction	Contractor	3000 USD
	Soil cover loss	- Create contour drains during Construction;	Before excavation	Contractor	1000 USD
	Land acquisition	- Purchase land from owners and work with district to provide alternative land for affected people	Prior works	Project developer/ districts	50,000 USD
	Loss of crops and trees	- Compensation of affected crops and trees	Prior work		15,000 USD
Construction of water treatment plant & reservoirs	Potential soil erosion during construction	- Only clear areas earmarked for construction - Constructions of water ways with check dams as to reduce sediment	Construction phase	Contractor	2000 USD
	Water and soil pollution from oil spilling	- Maintenance of cars and machinery to be done in appropriate places and far from water bodies	Construction phase	Contractor	1000 USD
	Injuries and accident on site	- Provision of protective equipment - Sensitization of workers on safety measures - First aid kit on the site	Construction sites	Contractor	1000 USD
	Air and noise pollution	- Construction activities shall be restricted to normal working hours (7h00-17h00) to prevent noise for neighbours at night - Use of equipment and automobiles that have certification of good working conditions from "National Automobile inspection centre" to reduce on noise or exhaust fumes emissions. - Ensure routine maintenance, repair of trucks and machines. - Spray water regularly when clearing land to reduce the dust.	Through the construction	Contractor	No budget required

Activity	Adverse Impacts	Proposed Mitigation measures	Implementation Schedule	Responsibility	Budget ($ US)
Sourcing of crush stones, gravel, sand etc	Potential Water and Land degradation	- Procurement of all raw materials and construction inputs from approved sources and quarries and gravel pits approved by RNRA.	Construction phase	Contractor	No budget required
Extraction of materials for construction	Land degradation	Backfilling borrow pits immediately after excavation and rehabilitating with vegetation	Construction phase	Contractor	5,000 USD
Construction of plant &reservoirs	Fugitive dust & respiratory diseases	Wetting the surface during construction	Construction phase	Contractor	outsourced (TBD)
		Provision of protective equipment to workers		Contractor	1000 USD
	Air pollution	Maintenance of equipment to minimize exhaust smoke, fuel and oil leaks.	Construction phase	Contractor	outsourced (TBD)
	High nuisance noise from construction activities	The Contractor shall restrict any of his operations, which result in undue noise disturbance to nearby communities and dwellings (e.g. blasting activities and operation of heavy machinery and construction traffic) between 18:00 and 06:00 hours.	Construction phase	Contractor	No budget required
Excavation	Dust emission	Regularly watering when clearing land to reduce the dust	Construction phase	Contractor	200 USD/day
		Provision of protective equipment to all workers		Contractor	1000 USD
Construction of wells, water reservoirs and water pipelines	Disturbance of natural soil structure, mixing of layers and	Top soil to be stored separately from subsoil. After completion of works, the top soil to be spread over those areas which can be partially restored in order to facilitate natural regeneration of those areas. Compaction of soil to be minimized by careful stockpiling and separation of top and subsoils.	Construction	Contractor and developer	3,000 USD
Construction of wells	Pollution of surface and ground water	- Staff to be regularly trained and sensitized on appropriate waste management. - On site adequate sanitary facilities have to be provided - All unused materials to be properly handled - Liquid waste to be properly managed to avoid their spoil - Regular monitoring by the professional in the domain.	Construction	Contractor and developer	2,000

Activity	Adverse Impacts	Proposed Mitigation measures	Implementation Schedule	Responsibility	Budget ($ US)
Construction of wells	Sediment load	- Proper handling of the produced waste. - All excavated material to be carefully reused, replaced and/or leveled and planted up with grass and other indigenous seedlings, as necessary.	construction	Contractor	Constructio n budget
Extraction of building materials	Water and land degradation	- Ensure that all raw materials and construction materials (Stones sand and gravel etc.) are procured from approved and licenced sources by competent authorities.	construction	contractor	No budget is required
Levelling of the WTP, Reservoir Sites and excavation of trenches for water pipelines,	Land degradation	All earthworks for site preparation and levelling shall be carried out in a proper designated manner and have to be done by qualified engineers. Wastes produced have to be disposed of at approved and licenced facilities. Third party facilities to be audited to ensure best environmental and social practices. Waste landfilling to be the last option after reuse, recycling and recovery.	Construction	Contractor	Construction cost
Construction of wells	Siltation and Diversion	Care to be taken to minimize and manage the work area particularly at the intake site but also at the Water Treatment Site and along the transmission pipelines.	Construction	Contractor	No budget required
Construction of wells, WTP, pipelines and reservoirs	Contamination of surface and ground water by human waste	Adequate sanitary facilities shall be provided for workers	Construction	Contractor	1,000
Excavation and aliment of pipe	Disturbance of traffic	Appropriate equipment and manpower in order to complete the work in short time especially for the section that cross roads. Appoint staff in charge of guiding cars Excavation and backfilling of the affected section during evening hours where there is no heavy traffic	During construction phase	Contactor	Construction budget
	Accident and injuries	Provision of protective equipment, first aid kits and training of workers on safety measures		Contactor	2000 USD
	Dust	Provision of protective equipment	Construction phase	Contactor	2000 USD
Welding, electrical installations to or from the power	Fire outbreaks	Regular checks on electrical installations and proper insulation of cables, to prevent short circuits that could trigger fires. Specific area restricted to only authorized personnel and with fire extinguishers, should be allocated for fuel storage.	During construction and installation	Contractor	Construction budget

Activity	Adverse Impacts	Proposed Mitigation measures	Implementation Schedule	Responsibility	Budget ($ US)
source, refuelling of equipment, smoking on site.		Water tank automobiles with hose pipes need to be part of the equipment required at the sites, soil/sand storage near high risks for chemical fires, for purposes of extinguishing fires. Fire management drills for the workers should regularly be done.			

Operation Phase Impacts, Mitigation and Cost

Activity	Adverse Impacts	Proposed Mitigation measures	Responsibility	Budget ($US)
Sludge production from WTP	Water and environmental pollution	- Dedicated and lined storage area at Water Treatment Plant to be provided and regular checked as appropriate as possible with appropriate personal and in safe protective Environment and equipment.	Project developer/ WASAC	2,000
Disposal of sludge produced from WTP	Environmental and water pollution	- Dewatered sludge to be reused first and then disposed of at nearest but licenced landfills. 3rd party audits to be conducted for duty of care.	WASAC/ project developer/ MINIRENA	2,000
Discharge of backwash effluent	Degradation of water quality in receiving water bodies	- Design of treatment process has to be done to ensure provision of adequate treatment to meet National discharge effluent standards into the environment. - Disposal of waste (solid and liquid) as well as hazardous waste (e.g. Empty bottles containers etc.) at licenced sites and far from water bodies.	WASAC/ project developer/ MINIRENA	2,000
Use of chemicals during treatment process	Ground and surface Water pollution	- Wastes to be properly stored in designated areas and be removed at regular intervals to offsite licenced waste disposal facilities. . - Liquid to be handled properly and only at places with a bund to minimise pollution risks. - Liquid fuel storage and dispensing to be done far from water bodies	WASAC/ project developer/ MINIRENA	2,000

Activity	Adverse Impacts	Proposed Mitigation measures	Responsibility	Budget ($US)
		- Provision of spill kits - MSDS to be stored near the chemicals.		
Sanitary	Bad smells from backwash effluent	- Proper management of WTP, pipes and reservoirs and regular maintenance of the infrastructures.	Project developer	2000
Groundwater abstraction	Flow regime decrease	- Regular monitoring of the water flow rates at Kanzenze station and upstream as well as provide recommendations, - Observation and monitoring of the downstream habitats.	Project developer/ WASAC/ RNRA	3,000
Water supply	Loss of water due to break of pipe or , water storages	- Regular monitoring and repair of infrastructures	Project developer	TBD
Operation phase	Vandalism of equipment	- Provision of guards and sensitisation of locals on protection and protection of infrastructure	WASAC, Project developer & Districts	500
Training Fees				20,000
TOTAL COST FOR ESMP IMPLEMENTATION				**123,000**

4. Enhancement/Mitigation Measures and Complementary Initiatives

Mitigation measures were proposed for each of the adverse impacts anticipated. Section 3 and 5 give the mitigation measures, monitoring indicators, the responsible institutions to implement these measures and likely cost of implementing them.

5. Environmental and Social Monitoring Programme:

In this section, a monitoring plan is proposed indicating measurements of parameters, responsibility and cost estimates of outcomes of the proposed mitigation measures.

Impact	Parameter	Indicator	Responsible	Frequency	Budget
Water and soil pollution	Contamination of surface and ground water	Records to be kept on site for inspection and approval of fuel and oil storage and dispensing facilities. Routine inspections will be made of such facilities for leaks and discharges to ground.	Project developer	Daily	None

Impact	Parameter	Indicator	Responsible	Frequency	Budget
Flow rate decreases	Ground water abstraction	Daily water discharge flow to be recorded and kept on site	Project developer	daily	2,000
Chemical uses during treatment process	Contamination of groundwater and discharge area	Amount of the sludge produced and the discharge area and surface. Routine inspection of water turbidity	WASAC/ project developer	Bi weekly	1,500
Water quality	Clean water quality parameters	Routine inspection of raw water quality and clean water at different point to assess the water quality.	WASAC/ project developer	daily	1,000
Discharge of backwash effluent	Degradation of receiving water bodies, groundwater contamination	Proper drainage and set up of waste water management plan.	WASAC/ project developer/ MINIRENA	daily	800
Sanitation and clean water parameters	Contamination of treated water	Proper management of waste (liquid and solid) as well as hazardous waste (e.g. Empty chemical containers) by an approved waste disposal company. Routine inspection and proper records will be kept regarding any incidents of spills and the corresponding actions regarding clean up	WASAC/ project developer/ MINIRENA	daily	2,000
Equipment and automobiles in good shape	Certification from Automobile inspection centre	Number of Automobiles with certification on site	Contractor	Quarterly	No cost applicable to monitor.
-Restriction of noise emitting activities to working hours. -Use of certified construction equipment in good condition. -Spraying of water to reduce dust.	Sound decibels.	• Sound levels • Air quality emission levels	contractor	During excavations, vibrations, etc	Sound meter 110US$.
Regular inspection of electrical installations, Fire extinguishers, water tanks	Fire management equipment	Number of fire extinguishers, water tanks, sand containers	Contractor.	Quarterly	150US$/ trip to inspect.
Reforestation to offset lost grasses and trees	Planted area	Number of planted hectares (ha)	Contractor & WASAC/ project developer	Quarterly	200US$

Impact	Parameter	Indicator	Responsible	Frequency	Budget
Compensation for land and houses lost	Houses &/land expropriated	• Number of houses. • Land area	WASAC/ project developer	Once before construction	200 US$
Safety gear for workers	Safety gear versus number of workers	Number of workers with safety gear	contractor	quarterly	150US$/ trip to inspect.
Modification of flows for downstream usage	Water quantity	Flow rate, Q (m^3/s)	WASAC/ project developer	annually	250US$/ annual flow analysis
Water pollution	Water quality	Nutrient load in water from non-point sources (NO_3^-, PO_4^{2-}, K).	WASAC/ project developer	Twice a year	150US$/ sample for a complete quality test.
Fees for Environmental and social officer					120,000/ 24 month
Total cost for monitoring					**129,560 USD**

6 Consultations

6.1 Institutions consulted included Rwanda Development Boards; Rwanda Natural Resources Authority, Water and Sanitation Corporation Ltd, Rwanda Environment Management Authority, Kicukiro District, Bugesera District. Public Consultation was undertaken in two phases, one during identifying social and environmental issues (scoping) and the other during impacts assessment study. Consultation meeting was conducted in Ntarama Sector, Kanzenze cell where most of proposed infrastructure will be constructed. Key issues identified during public consultations include:

6.2 Summary of issues recorded during Public consultation

Issues Raised	Stakeholders	Response to issues
Expropriation cost	locals	• No physical resettlement that is expected and the land required for construction will be purchased from the owners prior construction and after approval by owners? • Few crops and trees to be affected will be compensated using the market value and prior works
Possibility of low wages to local workers during construction works.	Local residents of the area	Kigali Bulk Water Supply project coordination to ensure minimum wages in line with Rwanda labour law are followed by the contractor.
Oil spillage	Contractor / MINIRENA/ REMA	Restricted area proposed for re-fuelling or fuel storage that is concreted. Use of automobiles in good condition hence reducing on chances of oil leaking.
Dangerous borrow pits used at potential construction materials sites	contractor / Local authorities/ REMA	Refilling pits prior to the closure of the contract avoid injuries and planting vegetation to rejuvenate these areas. Backfilling excavated areas immediately and safely. Cordoning off ones where work is ongoing
Occupational health hazards	REMA/District and sector officials	Safety equipment is proposed on site. Spraying water to reduce dust is also proposed.
Noise pollution	Local residents/ sector officials / REMA	Works such as; excavations, compaction that emit irritating noise will only be done during working hours (from 6am to 6 pm. Use of automobiles in good condition (with certification from the "National Automobile Inspection centre") to minimize on noise emitted, Use of silencers for generators
Air/dust pollution	Local residents/ sector officials / REMA	Use of automobiles in good condition (with certification from the "National Automobile Inspection centre") to minimize on noise emitted, Use of silencers for generators. Watering where possible.
Fire outbreaks	Local authorities/	Fuel storage restricted to only those authorized; regular checks of electrical installations; Firefighting equipment present and fire drills conducted periodically
Water pollution	REMA/ MINIRENA/ RNRA	Ground water will be abstracted in almost 30 m from the river bank and other infrastructures are far from water bodies. Therefore, the possibility of water pollution is minimal
Vandalism of water supply infrastructure	Locals and local leaders	Community policing will be involved in protection of infrastructure and local communities will be sensitize.
Sedimentation and destruction of	REMA/RNRA/ MINIRENA	The proposed infrastructure will be in 20 m from the river bank which is bigger than 10 m provided by the law

Issues Raised	Stakeholders	Response to issues
Nyabarongo River bank		
Water supply to locals	WASAC, Locals, Local leaders	The treated water will be connected to the existing system and locals will benefit from increased clean water. WASAC will apply the existing tariff.

7. Responsibilities and Institutional Arrangements

7.1 Institutional arrangement for the environmental management in Rwanda

The institutional framework for environmental management is currently enshrined in the organic law determining the modalities of protection, conservation and promotion of the environment in Rwanda, published in the official gazette rwa nº 9 of the 1st may 2005, particularly in its chapter iii relating to the establishment of the institutions.

7.2 Ministry Of Infrastructure (MININFRA)

Among others the ministry of infrastructure shall supervise activities meant to elaborate, monitor and assess the implementation of national policies and programs on matters relating to habitat and urbanism, transport, energy, water and sanitation and meteorology.

7.3 Ministry Of Natural Resources (MINIRENA)

MINIRENA like any other lead agency is supposed to perform the following functions in the ESIA process:

- Participate in screening at the request of REMA,
- Publish the list of ESIA practitioners
- At the request of REMA, review project briefs so as to advise on terms of reference,
- Ensure that their own projects adhere to ESIA requirements,
- Ensure that private-sector projects in fields over which they have jurisdiction comply with ESIA requirements,
- At the request of REMA, review ESIA report,
- Serve on REMA'S technical committee,
- Serve on REMA'S executive committee,
- Provide information or advice to developers and ESIA experts during ESIA process,
- Participate as panelist at public hearings held during the conduct of ESIA,
- Advise developers on the requirement for ESIA (where relevant) before licensing their projects,
- Assist in inspecting and monitoring environmental compliance by ensuring that licensing terms and conditions are met, including those specified by REMA.

7.4 Water and Sanitation Corporation Ltd

Water and Sanitation Corporation is a new company created by the law nº 87/03 of 16/08/2014. The water and sanitation corporation (WASAC) is the entity setup to manage the water and sanitation services in Rwanda as a result of the government of Rwanda (GOR) decision to unbundle the national utility former EWSA. The reform is intended to deliver a water and sanitation utility sufficiently focused to deliver new infrastructure; efficient and effective service delivery; build a strong people capability; and meet key national milestones. It is expected to reverse the status quo that includes inadequate planning and investments; inefficient and wasteful operations; inadequate institutional management focus; improve viability and autonomy; and establish a sustainable and customer centric utility to deliver an important

mandate that touches people of all walks of life. The mission of the company is providing quality, reliable and affordable water and sewerage services through continuous innovations and detailed care to customers' needs.

7.5 Rwanda Environment Management Authority (REMA)

Rwanda environment management authority (REMA) was established in2004 to act as the implementation organ of environment related policies and laws in Rwanda. 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 decisions taken by the board of directors 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; etc.

7.6 Rwanda Natural Resources Authority (RNRA)

RNRA is a national authority under the ministry of natural resources, established in January 2011 by the n°53/2010 of 25/01/2011 that heads the management of promotion of natural resources which is composed of land, water, forests and mines. It is entrusted with supervision, monitoring and to ensure the implementation of all issues relating to promotion and protection of natural resources.

7.7 Rwanda Development Board (RDB)

RDB was created by organic law n° 53/2008 of 02/09/2008. It has a mission of improving the well-being of all Rwandans by fast-tracking development, catalysing sustainable economic growth, and creating prosperity for all. This a one stop institution bringing together several government bodies in Rwanda focused at promoting investment in Rwanda. Initially the responsibility for reviewing and approving ESIA reports was entrusted to REMA, this duty has now been transferred to the newly created Rwanda development board (RDB) where a department of ESIA has been created and tasked with review and approvals of all ESIA reports for proposed projects and programmes before they are approved for implementation. The key responsibility of ESIA department under one stop centre in RDB is to:

- Receive and register ESIA applications (project briefs) submitted by developers;
- Identify relevant lead agencies to review project briefs and provide necessary input during screening,
- Review project briefs and determine project classification at screening stage,
- Transmit project briefs to relevant lead agencies and concerned local governments to provide input on terms of reference (TOR),
- Publicize project briefs and collect public comments during development of tor,
- Receive ESIA documents submitted by a developer and verify that they are complete,
- Transmit copy of ESIA reports to relevant lead agencies, local governments and communities to review and make comments,
- Review ESIA reports and make decision on approval, organize and conduct public hearings, appoint an officer from authority to chair public hearings, receive public comments and compile public hearing reports,
- Appoint the technical committee and its representative to the technical committee,
- Forward ESIA documents (ESIA report, environment monitoring plan and public hearing report) to the technical committee,
- Chair the executive committee which makes final decision on approval of a project,
- Communicate decision on whether or not a proposed project is approved,
- Issue to developers ESIA certificate of authorization if their projects are approved. For kigali bulk water project the ESIA certificate has been approved along with condition of approval.

7.8 Local governments

Generally, decentralized entities are responsible for the implementation of laws, policies, strategies, objectives and programmes relating to protection, conservation and promotion of the environment in Rwanda. Article 61 of environmental law state that in the framework of conservation and protection of the environment, decentralized entities are particularly responsible for:

- Ensuring activities related to better management of land, especially controlling soil erosion and tap rain water;
- Afforestation, protection and proper management of forests;
- Efficient management of rivers, lakes, sources of water and underground water;
- Efficient management and effective use of swamps;
- Protection and proper management of reserved areas, historical sites, endangered animal and plant species.

For the Kigali bulk water project, and under the general guidelines and procedure for ESIA local governments including Bugesera district and Kicukiro district and their respective sectors are tasked to perform the following functions:

- At the request of RDB, review project briefs so as to advise on terms of reference,
- Provide information or advice to developers and ESIA experts when consulted during ESIA process,
- At the request of RDB, review ESIA reports and provide comments to RDB,
- Assist RDB in organizing public hearings,
- Host public hearings,
- Host individual consultations,
- Gather written comments from public and transmit them to RDB.
- Facilitate the land acquisition process through land bureau office;
- Participate in the implementation of the mitigation plan, monitoring plan, emergency preparedness plan and complaints resolutions.

7.9 Kigali Water Limited

Kigali Water Limited and WASAC are the key player in the Kigali bulk water project. For a successful implementation of the project in compliance with environmental and social standards Kigali water limited has established his office in Kigali. This office will lead the implementation and monitoring of this ESMP in collaboration with the above stakeholders. The monitoring and implementation task will be assigned to the contractor to be hired and supervision team that will include an environmental and social safeguards specialist.

8 Estimated Cost

The total ESMP implementation cost as shown in section 4 is 123000 USD plus the monitoring costs of 129560 hence making the total cost for environment and social impact mitigation **USD252 560.00**.

9 Conclusion:

In conclusion, given the nature and location of the development, the potential impacts associated with the proposed Kigali bulk water Supply project is of a nature and extent that can be reduced, limited and eliminated by the application of appropriate mitigation measures. As a matter of fact, compliance with the proposed mitigation measures and regular monitoring done as per the Environmental and social management and monitoring plans issued in the report, the Kigali bulk water project is bound to be executed in a sustainable manner and in compliance with national, IFC environmental and social requirements as well as Afdb's ISS.

10 References and Contacts

Reference:

1. ESIA report by Engineering Consults Group (ECG File No. 2166) - September 2015.

Contacts:

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