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Rwanda Transport Development Agency (RTDA)

Environmental and Social Impact Assessment (ESIA) For the Upgrading project of Ngoma-Nyanza Road

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Acronyms and abbreviations

AIDS:	*Acquired Immune Deficiency Syndrome*
ARVs:	*Anti-Retro Viral*
BP:	*Bank Procedures*
CBOs:	*Community Based Organizations*
CC:	*Construction Contractor*
CITES:	*Convention on International Trade of Endangered Species*
CSO:	*Civil Society Organizations*
DDP:	*District Development Plan*
ED&P:	*Eco Design &Protection Ltd*
EDPRS:	*Economic Development and Poverty Reduction Strategy*
EHS:	*Environment, Health and Safety*
EIA:	*Environmental Impact Assessment*
EICV3:	*Enquête Intégrale sur les Conditions de vie des Ménages*
EMP:	*Environmental Management Plan*
ESIA:	*Environmental and Social Impact Assessment*
ESMP:	*Environmental and Social Management Plan*
ESO:	*Environmental and Safety Officer*
ESU:	*Environmental and Social Unit*
FONERWA:	*Fond National pour l'Environnement au Rwanda*
FRAP:	*Full Resettlement Action Plan*
GRC:	*Grievance Redress Committee*
HGV:	*Heavy Goods Vehicles*
HIMO:	*Haute Intensité de Main d'Oeuvre*
HIV:	*Human Immune Deficiency Virus*
HSE:	*Health, Safety and Environment*
I&A:	*Interested and Affected Parties*
ICT:	*Information and Communication Technology*
IESIA:	*Integrated Environmental and Social Impact Assessment*
IUCN:	*International Union for Conservation of Nature*
JICA:	*Japaneese International Corporation Agency*
MDGs:	*Millenium Development Goals*
MINAGRI:	*Ministry of Agriculture and Animal Resources*
MINEAC:	*Ministry of East African Community*
MINECOFIN:	*Ministry of Economy and Planning*
MININFRA:	*Ministry of Infrastructure*
MINIRENA:	*Ministry of Natural Resources*
MOU:	*Memorendum of understanding*
MSDS:	*Material Safety Data Sheets*
MTN:	*Microbicide Trials Network*
MTPM:	*Monitoring Team and Project Management*
MUPI:	*Monitoring Unit and Project Implementation*
NGO:	*Non-Governmental Organization*
OP:	*Operation Procedures*
OS:	*Operational Safeguards*
PAPs:	*Persons Affected by the Project*
PPE:	*Personal Protective Equipment*

RAP:	*Resettlement Action Plan*
RAW:	*Rapid Appraisal Work*
RDB:	*Rwanda Development Board*
RE:	*Resident Engineer*
REMA:	*Rwanda Environmental Management Authority*
ROW:	*Right of Way*
RSB:	*Rwanda Standard Board*
RTDA:	*Rwanda Transport Development Agency*
RURA:	*Rwanda Utilities Regulatory Agency*
SEC:	*Supervising and Engineering Consultant*
SFP:	*Supplementary Feeding Programme*
SME's:	*Small & Medium Enterprises*
STD:	*Sexual Transmitted Disease*
SWAP:	*Sector Wide Approach*
UNDP:	*Unites Nations Development Programme*
UNEP:	*Unites Nations Environment Programme*
WHO:	*World Health Organization*

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Executive Summary

1.1 Introduction

Environmental Impact Assessment is an environmental management tool for the protection of the environment from the negative effects of development activities. It is now accepted that development projects must economically be viable, socially acceptable and environmentally sound. It is a condition by the Rwandan Government for the developers to conduct Environmental Impact Assessment on various development projects.

There is a growing concern in Rwanda and at the global level that many forms of development activities are causing damage to the environment. Development activities have the potential to damage the natural resources upon which the economies are based. A major national and global challenge today is how to attain sustainable development.

Road construction is in the category of activities that must be subjected to environmental impact assessment. To adequately address the environmental issues emanating from the implementation of the Ngoma-nyanza road (NR6) construction and upgrading project, a team of consultants from Eco Design & Protection Ltd led by Mr. Richard Ngendahayo carried out Environmental and Social Impact Assessment (ESIA) study at the proposed sites and also the surrounding areas.

The overall scope of work under the ESIA comprises alternative site analysis and selection of best site, conduct environmental baseline survey and select environmental and social components likely to be impacted by the project, assessment and evaluation of impacts, conduct public consultation to obtain stakeholders's views and concerns on the project, preparation of detail Environmental and Social Management Plan (ESMP) and finally to obtain an 'Environmental Clearance' from RDB. The ESIA study specifically included the following scope of works:

- *Description of the environmental baseline situation of the area;*
- *With a view to examining the probable environmental impacts, a baseline survey was conducted through the proposed ROW. The study explored positive and negative impacts on the basis of such baseline situation.*
- *Identifying alternative road alignment and its suitability;*
- *Identifying and analyzing the potential environmental impacts and Mitigation measures*
- *Public Consultations for the stakeholder's perception on the projects; and*
- *Preparing an Environmental and Social Management Plan, this would include mitigation and monitoring plan.*

1.2. Policy, Legal and Administrative Framework

The ESIA was carried out with reference to the key policy, legal and administrative instruments at national and international levels. Some of the instruments consulted included the Constitution of the Republic of Rwanda, 2003; Environmental Organic Law N° 04/2005; National Environment Policy, 2003; Transport policy, 2008; Law N° 32/2015 of 11/06/2015 relating to expropriation in the public interest; Ministerial orders N° 003/2008 and N°004/2008 specifying respectively the requirements and procedure for environmental impact assessment and the works, activities and projects that have to undertake an EIA. Ministerial Orders N° 005/2008 and N° 007/2008 establishing respectively modalities of inspecting companies or activities that pollute the environment and the list of protected animal and plant species and others. Reference was made to the World Bank Operation Policies that are triggered by this project. They include:

1. Environmental Assessment (OP 4.01)

2. Natural Habitats (OP 4.04)

3. 4. Physical Cultural Resources (OP 4.11)
4. Involuntary Resettlement (OP 4.12)

Reference was also made on Jica Guidelines for Environmental and Social Considerations. The relevant conventions to which Rwanda is a signatory were also outlined.

1.3. Project Description and Justification

The project concept is to upgrade the existing Ngoma-Nyanza road (NR6) Road to high class engineered bitumen standard. The road will involve a lot of civil works including clearing, excavation and levelling of soil, mining of gravel and quarry, transportation of materials, water use, compaction of sub-base material, road sealing, construction of road related infrastructure such as bridges and drainage systems, shouldering, road signage and others. The contractor is likely to use heavy machines such as excavators, earth moving equipment, compactors and other lighter equipment. Road rehabilitation demands high engineering standards and will therefore necessitate the deployment of qualified civil engineers and other experts include various technicians and a reasonable labour force. Several campsites will be built to accommodate staff and facilitate the storage of materials and equipment.

It is likely that these activities will cause significant environmental and social impacts that may be reversible depending on their magnitude. Prevention of such impacts is a priority but where it cannot be achieved, appropriate mitigation and pollution abatement measures will be put in place to minimize environmental damage.

The Ngoma-Nyanza road-upgrading project is an important infrastructure that aims to improve Eastern and Southern Provinces accessibility. The road has been instrumental in facilitating trade, tourism, agriculture, health, education and other sectors of the economy. The planned construction of Bugesera International Airport will further enhance the importance rehabilitating Ngoma-Nyanza road,

The road will also reduce the Number of accidents due to the Safety Designs, realignment, superb road furniture and signage.

On a regional perspective, the project is to be implemented in the context of Lake Victoria Transport Program (LVTP). The LVTP objective has been identified as to contribute to the efficient and safe movement of goods and people in accessing and traversing Lake Victoria. Ngoma-Nyanza road will ease and fast the traffic with Tanzania, Burundi and Rwanda. The road gives opportunity to trade with the three countries from the south to the east without crossing Kigali and Kayonza.

1.4. Description of Project Environment

Baseline data was first collected from secondary data, however it was found that not much data has been collected in the area. Therefore primary data have been collected through interviews, sites visits and socio-economic survey questionnaire (annexure 9).

Data collected included information on physical environment: geology; topography; soils; seasonal data on climate and meteorology; ambient air quality; surface and ground water hydrology; existing water pollution discharges; and receiving water quality, biological environment: flora; fauna; rare or IUCN/CITES species; sensitive habitats, including significant natural sites etc.; species of commercial importance; species with potential to become nuisances, vectors or dangerous and socio-cultural environment: population, land use; planned development activities; community structure; employment; distribution of income, goods and services; recreation; public health and safety; cultural aspects/properties; aspirations and attitudes.

Ngoma-Nyaza road extends on 130km approximately and crosses three districts, Ngoma, Bugesera and Nyanza. Ngoma-Nyanza road project area is located in the lowlands of the East. The project area is found in the southeastern plains of Rwanda's Eastern Province and a part of Western Province. The region is sandwitched between Rivers Nyabarongo and Akanyaru, which converge at the southern end to form the Akagera River.

The lowlands are dominated by a depression of the relief, generally undulating between 1500-1300 m of altitude. Ngoma Bugesera and Nyanza's relief is characterised by the lowlands, dominated by a depression of the relief, generally undulating between 1500-1100 m of altitude. The geological nature of the project area is dominated by the folded sediments, consisting of the successive layers of pelitic rocks, especially of phyllite and the argillaceous schist, arenaceous rocks like the quartzose and quartzite.

The hydrological system of Ngoma – Nyanza road project area belongs to the Nile Basin and the Akagera sub-basin. The whole of the area is characterized by the marshy and Lake Complex of Akanyaru, upstream, the marshy and lake system of Nyabarongo-Akagera, downstream. The principal marshy extents of Bugesera are, on the one hand the Lower Akanyaru Complex and its Nyavyamo tributaries downstream from Lake Rwihinda and Cyohoha Lake, and on the other hand, the Rweru-Kanzigiri Complex and Akagera right in its downstream.

The region is predominantly vegetated by dry savannas, which are characterised by short grasses, shrubs and short trees characteristic of arid and semi-arid areas. Part of the Gako military domain where the thick natural wood lands still exist, it is crossed by the road but won't be touched by the upgrade of Ngoma-Nyaza road. Gako military domain is not listed as national parks or natural reserves of Rwanda (REMA 2015).

The road Ngoma-Nyanza road traverses three important natural habitats; Gako military domain, Akagera wetlands and Akanyaru wetlands. Gako military domain plays an important role as a refuge to many flora and fauna species. Akanyaru wetland was recognized recently as an Important Birding Area while the Akagera wetland complex is only proposed to be a RAMSAR site and is not part of the Akagera National Park. These three natural habitats are identified in the project area of influence, hosting important biodiversity including IUCN and CITES species. Nyabarongo eventually forming the main tributary of the Kagera River, its wetlands are not crossed by Ngoma-Nyanza road to be upgraded.

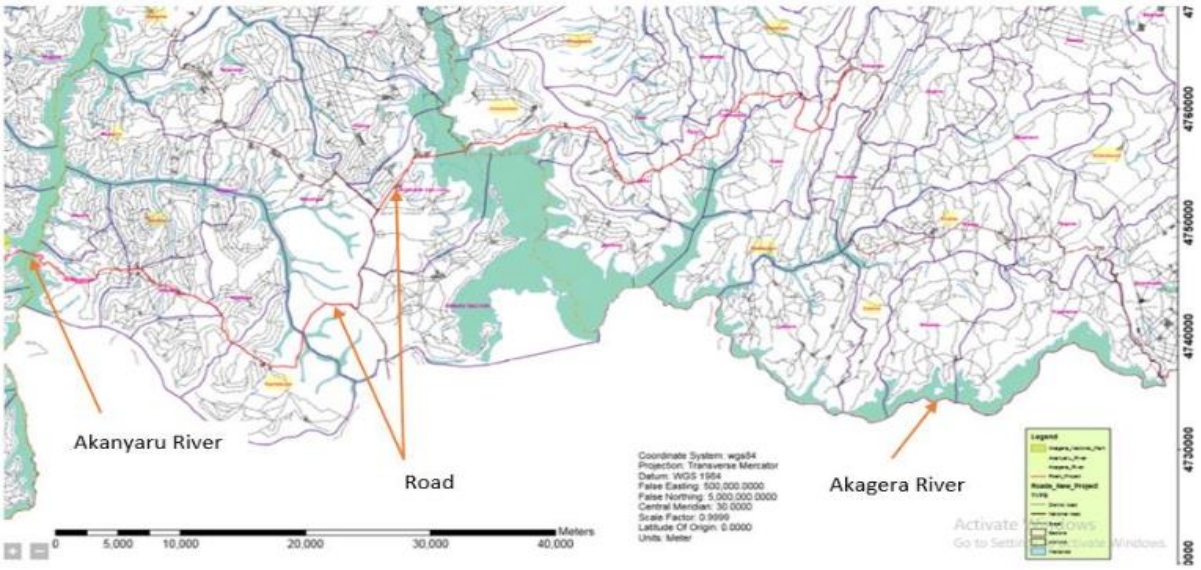

Figure 1-1: Ngoma-Nyanza road crossing Akagera and Akanyaru Rivers

Agriculture and tourism are the two key sectors of the local economy. In conclusion, the physical setup and the service level of the road network is somehow unbalanced needing improvements namely in the southern sectors and also the interconnection with western neighbouring districts need to be improved. The project will ensure the direct connection of Eastern Province to Southern Province.

1.5. Potential Impacts and Mitigation/Enhancement Measures

Activities, which will affect Environmental Components in the three phases namely: Pre- Construction, Construction and Post Construction are as follows:

1.5.1 Pre-Construction Phase

Execution of site surveys and Investigations will result in habitat destruction and disturbance to wildlife; there will also be public uncertainty regarding land and property acquisition, as well as nature and scale of the proposed works, arising from the presence of the survey and investigation teams. There will also be an influx of people coming to look for jobs and thus disturbing the social structure and cultural activities in the project areas.

1.5.2 Construction Phase

Project activities likely to cause negative impact include: Workforce deployment, General Construction works like: site clearing, Deployment of heavy machinery, Haulage of construction materials, earth works like cutting, pavement, shoulders and lateral drainage works, construction of bridges and culverts. Other major activities include: development of quarries and borrow pits, Operation of earth works like stockpiles and spoil sites and disposal areas.

The road traverses three natural habitats, Akagera and Akanyaru wetlands and Gako military domain that could be impacted by the project construction activities.

1.5.3 Post Operational Phase

During the Operational Phase, there will be an increase in noise levels affecting people and properties adjacent to the road arising from increased vehicle traffic levels; increase in air pollution from carbon monoxide, nitrogen Oxides and other particulate matter, water pollution arising from pavement run-off containing hydrocarbons and other toxic residues deposited by passing vehicles.

1.5.5 Project impacts of the proposed Ngoma-Nyanza road project

1.5.5.1 Design and Construction phases

a) Beneficial impacts

The positive impacts that were identified during the construction of proposed road were;

1. *Creation of employment for the skilled and semiskilled locals,*
2. *Flourishing of businesses mainly at trading centres located along the road due to increased demand of basic commodities and services such as food, accommodation and construction materials.*

b) Adverse impacts

a. *The negative impacts identified during the upgrading of the proposed road are loss of land and assets.*

The project will have adverse impacts in terms of activities that will trigger off resettlement of the local communities living or utilizing the land for different reasons in the selected project

*area. People affected that will be physically dispaced by the project are subdivided into two main categories. Findings revealed that up to **312** households subdivided in 2 lots, namely for lot 1 Ngoma-Ramiro (58.2 km) with 68 Households will be physically displaced with a total number of 429 affected people, and for For Lot 2 from Kibugabuga (in Bugesera District) to Gasoro (in Nyanza District) on total length of 66.55km: 244 Households will be physically displaced with a total number of 1535 affected people.*

*In addition, **586** households will be economically displaced and partially affected by losing crops, trees, land and part of premises without necessarily having to be displaced to give way for the implementation of the proposed road upgrading project. Also, 11 social structures which include 4 schools, 2 churches, 4 hospitals and 1 market which will be partly or completely affected.*

It was estimated the cost for Ressetlment Action Plan would cost around FRW7,015,399,255 (equivalent to US$ 8,253,4128)

Disruption to access to homes and institutions. Access to homes, institutions and services, which is already limited in the road corridor, will be compromised by the road rehabilitation activities. Also, a temporary disruption of connections can be observed: problems of access to property, agricultural plots housing, etc.

b. *Increased soil erosion and pollution due to excavation works along the road alignment as well as improper drainage of runoff from the road to lower catchment areas. This is likely to be of high magnitude in the steep areas.*

c. *There may be pollution of air, soils and water resources along the road profile resulting from exhaust and engine emissions from vehicles and equipment used during the construction.*

d. *The proposed road upgrading at the road junction and acquisition of construction materials sourcing areas located on private land are likely to result into loss of land. This may also be caused by temporarily traffic diversions on private land where the road reserve is not adequate.*

e. *There may be increased solid and liquid waste, which may lead to pollution of air, land and water sources in the area.*

f. *The road construction works may also lead to increased cases of sexually transmitted due to influx of workmen who are associated with irresponsible behaviours.*

g. *There is likely to be destruction of biodiversity along the road profile, access routes to the borrow pits and the borrow pit sites.*

h. *The noise from vehicles and equipment used during construction may scare away the wild animals.*

1.5.5.2 Operational phase

a) Positive Impacts

i. *Increased business opportunities due to opening up of the area as well as demand for basic commodities. The road may lead to development of trading centres as well as*

improvement of existing ones in terms of basic needs such as housing, water and sanitation facilities.

ii. *The water available to the surrounding communities will increase since the water sources developed by the contractor for construction works will be handed over to them.*

iii. *There will be enhancement of business in the area such as agriculture and trading due to reduce transport costs and time to market centres.*

iv. *The road may also open up the area to tourists since the road traverses natural habitats that have indigenous and wild animals.*

b) Negative Impacts

i. *Exhaust and engine emissions from vehicles used for transportation of materials and equipment may cause air pollution, which can have an impact on public health, crops and vegetation along the road, soils and water sources. Regular servicing of these vehicles may reduce the emissions.*

ii. *Increased traffic along this route may lead to accidents along the road network. The designs should make provision for bumps in the appropriate places.*

iii. *The road will be used for transportation of heavy loads along Ngoma-Nyanza. This may lead to development of potholes along the road. The Contractor must ensure regular maintenance of the road in adequate time.*

iv. *There may also be increased sexually transmitted diseases especially from the workers and truck drivers who are associated with irresponsible sexual behaviours. Training should continue in the trading centres and in the areas where the workers well be accommodated.*

1.5.5.3 Decommissioning Impacts

a) Positive Impacts

i. *There will be creation of employment although short lived for locals who will be involved in dismantling the labour camps.*

ii. *The contractor may consider selling off the construction materials such as campsite to community living around the construction camps.*

b) Negative Impacts

i. *There are likely to be accidents during the dismantling of the road construction camps and rehabilitation of borrow pits and quarries. Barriers should be put where heavy machinery will be under use to prevent people trespassing. The Contractor should also employ competent people to operate the machines used in order to maintain this to a minimum.*

ii. *During the dismantling works, there is likely to be noise to the households living around the camps. The Contractor should consider putting up the camps in less occupied areas.*

iii. *There will be air pollution from the equipment that will be used during the demolition works from dust. The exhaust fumes from vehicles and equipment used is also likely to pollute the soils, vegetation and water sources around the camp. The Contractor should consider watering the area before demolition work starts.*

1.6. Proposed Mitigation Measures

The mitigation measures that can be incorporated into the design of the road network, during construction and operation stages of the Ngoma-Nyanza road in order to mitigate the negative environmental impacts are;

i. *Construction of culverts will be accounted for in the road design so that flow in the rivers and streams in unimpeded, and improved drainage along the project road through side drains. These features must be properly designed and regularly maintained to prevent runoff from accumulating by the side of the road.*

ii. *The land acquisition temporary and permanent will be minimum. Construction activities will be confined on the strcict minimum of land required. Barriers are recommended to show the boundary of construction activities especially on areas closed to the three critical habitats.*

iii. *All the affected people will be compensated as per regulation before commencement of Construction works.*

iv. *Restoration of land after road construction must be done.*

v. *In some areas, Scour checks and gabion mattresses will be introduced in the side drains at specified intervals to reduce the impact of runoff. Embankments should be planted with shrubs and grasses to reduce erosion of road embankments. Gravel sites must be made good and indigenous trees and shrubs planted along the road.*

vi. *Dust emissions can be reduced during construction by occasional spraying with water along the deviation routes or earth along the road section. In the case of deviations, slowing the speed of traffic by using bumps and/ or clearly marked road signs may contribute to reducing dust levels. Haulage routes will need to be identified and maintained by watering to minimize the impact of dust.*

vii. *Vehicles to be used during construction must be regularly maintained. Proper disposal of oil drained from Contractor's trucks and lorries and used oil filters should be done sensibly with the supervision team approving method of disposal.*

viii. *Blasting of rock outcrops along road alignment should be done during the day, and residents in the vicinity of the area being blasted should be suitably warned of blasting activities, including the time and date that the blasting is to take place.*

ix. *People should be informed of intended roadwork activities, including likely dates for commencement and completion of works. Warning signs should also be introduced on the approach to market/settlement areas.*

x. *Alternative water sources for the project must be developed such as surface water to avoid stressing the already scarce commodity. The water quality supplied to the construction camps must meet the regulations on drinking water.*

xi. *Workmen should be provided with suitable protective gear (such as nose masks, ear muffs, helmets, overalls, industrial boots, etc.), particularly during blasting, drilling, while working on the asphalt, and handling tar. There must be a fully equipped first aid kit and a Health Safety and staff who has first aid training and knowledge of safety regulations. In addition, the Contractor must have workmen's insurance.*

xii. *The location of latrines in the camp should preferably be downhill of potable water sources, or 50 m to 100m from any water body. Communal bathrooms/ lavatories with soak away pits are less polluting option, but would be slightly more expensive.*

xiii. *STDs and HIV/AIDS awareness campaigns should be conducted in the camp as well as in the settlements/ trading centres and a programme focussing of children sexual abuse must be implemented*

xiv. *Road safety should be observed through for example the use of signs and especially near market centres.*

xv. *All the people who live along the road as well as affected communities will be sensitized of the improvement works through public consultation about the road safety guidelines.*

The reconstruction of Ngoma-Nyanza Road is an important project that has numerous benefits including facilitation of trade, reduction in travel times, boosting of local and national economies, local employment and improvement of social services such as education and health. However the ESIA study has illustrated that this development will be realized at a cost. The study showed that the environment and social contexts will be interfered with in varying magnitudes such as through soil erosion; loss of trees; disturbance to ecosystems; pollution of water, air and soils; loss of property and land; possible relocation and acquisition of private land; proliferation of communicable diseases and general degradation of the environment. The study has therefore proposed several mitigation measures to control reduce or reverse the perceived impacts. It has also proposed implementation and monitoring mechanisms of the environmental and social management plan. Finally mitigation measures have been proposed to guide the contractor on broader issues of environmental and social significance. Some of the recommendations include the following:

- *The Contractor should comply with legal obligations related to this project and should use the National Environmental Standards as a guide for limits or the WBG EHS Guidelines, whichever is more stringent.*
- *All displaced parties and other groups who will lose property should be fairly and promptly compensated.*
- *The Contractor should closely work with district and National authorities during the entire project implementation period.*
- *The developer and contractor should follow procedure for land acquisition and use for various purposes of the project.*
- *The Contractor should fully rehabilitate campsites, quarries and borrow pits and road sides after project completion*
- *A comprehensive HIV/AIDS programme should be developed to facilitate sensitizations and training of workers and the general public.*
- *Land that has been used for temporary works of the project should be rehabilitated to the rightful owners immediately after completion of the works.*

1.7. Public Consultations

Consultation with all project stakeholders began during the Scoping phase and continued throughout the entire ESIA process and will continue during the Ngoma-Nyanza reconstruction and operational phases. Six meetings took place in all the three Districts; an introduction meeting with the Vice Mayors and other relevant officers and a consultation meeting with the residents from the communities living in the project area, local institutions, community based organisations and other opinion leaders.

A wide consultative meeting was organized on 9th August 2016 in Bugesera and Ngoma districts and 11th August 2016 in Nyanza District (list of participants in annex 2) and grouped the identified relevant stakeholders as listed below.

- *Local populations affected or interested by the project*
- *RTDA*
- *REMA*
- *Districts local authorities*
- *Water and Sanitation Corporation (WASAC)*
- *Rwanda National Police (RNP)*
- *Leaders at sector, cell and village levels*
- *Youth and women committees*

- *Opinion leaders*
- *Religious communities*
- *Community members and farmers expected to be affected by the project*

The main issues raised were related to delay of expropriation and fair compensation of PAPs, properties not inventoried but damaged during construction, employment opportunities and impacts related to accidents, noise and vibrations.
Stakeholders were ensured the construction phase of the project would not start before all PAPs have been compensated, a committee to resolve all grievances will be functional and the locals will be in the first priority for employment to maximise the socio-economic benefits of the project. An ESMP will be implemented to address all possible and negative impacts including noise and vibration.

Various stakeholders were consulted during the preparation of the ESIA. These included local communities, local authorities, and Investment and Business Promotion department of RDB in charge of issuing EIA clearance, Roads Authority, and district authorities. Key concerns included compensation issues and employment.

Communities were also requesting for appropriate road signage to prevent accidents during road rehabilitation.

1.8. Environmental and Social Management Planning

Most of the identified impacts are reversible and few can be irreversible if not mitigated. Loss of physical assets and land, impact on flora and fauna including IUCN and CITES species from the three natural habitats crossed by the road need to be adequately mitigated and monitored. The spread of STDs and HIV/AIDS becomes the most severe impact of the influx of outside workers. The contractor will use a number of interventions to control negative impacts from the project. Some of the mitigation measure include workplace and community sensitizations on the dangers of HIV/Aids and other Sexually Transmission Infections (STDs), restoration of wetlands buffer zones, protection of natural habitats from contamination and destruction of its important plant and birds species, use of water to control dust, construction of appropriate drainage structures to prevent soil erosion and protect stream from sedimentation, use of standard equipment with catalytic converters and low noise, selection of appropriate times for blasting and other operations that generate noise, rehabilitation and reforestation of road reserves and other working areas, appropriate and authorized waste disposal, equitable compensation of property and land according to the provision of the regulation of expropriation in the public interest , provision of alternative livelihood systems, protection of river catchment areas and wildlife habitats, comprehensive public education and sensitizations on road activities and expected impacts; and appropriate land use planning.

Monitoring Program

Environmental monitoring programme will be done at three levels. At Contractor level the key staff to be involved in monitoring will be Environmental Monitoring Officer that will be appointed by the contractor to insure the implementation of the proposed ESMP. At district level, the District Environmental and land Subcommittee will lead the monitoring process in liaison with the Monitoring and Evaluation Officer. At national level, the key Authority will include REMA, RNRA and RTDA. These will work closely in monitoring of the project in liaison with district and community level stakeholders. REMA will be responsible overseeing the implementation of the Environment and Social Management and Plan. The District and RNRA will monitor the compensation process while the RTDA will monitor the technical and environmental design aspects of the road construction. The national Level Stakeholders will provide accurate and timely feedback to the funding institution on the overall project implementation and environmental accountability.

1.9 Conclusion and recommendations

From the foregoing the following conclusions are made:

- *No serious and adverse objections were received from the communities occupying the entire Ngoma-Nyanza road alignment. The road will lead to economic improvement to people living along the road profile and surrounding region. It is therefore considered suitable for the local area.*
- *The proposed Ngoma-Nyanza road project has actively involved the key stakeholders who did not object the development. Thus the success of the implementation project can be guaranteed.*
- *The proposed project does not pose adverse socio-economic impacts and is an initiative towards improving accessibility in the area. Therefore, it is a project worth to be implemented.*

In conclusion, this ESIA recommends timely implementation of the project with strict adherence to the proposed Environmental Management and Social Management Plans. The project benefits have been identified to far outweigh the adverse impacts for which a mitigation plan has been prepared. Further, the proponent has carefully considered and applied acceptable local and international standard/regulations at all stage of project planning and would thus qualify for issuing the environmental clearance certificate.

Following the impact analysis presented in the previous sections, here below are the recommendations:

- *The Proposed project to be implemented in compliance with the relevant legislation and planning requirements. The proponent must ensure that the impacts are kept to a minimum level*
- *A clear environmental and social management plans have been developed. The proponent should ensure the implement the mitigation guideline provided in the EMP in collaboration with the Contractor. The Resident Engineer for the project needs to make progress reports indicating the implementation.*

1. Introduction

Infrastructure development is one of the prerequisites for the growth of African economies. The Government of Rwanda has placed infrastructure development as one of its top priorities on its agenda for economic transformation as depicted in the Rwanda Vision 2020 and EDPRS II. Roads are a key part of the national infrastructure that stimulates development by linking various economic destinations across and outside the country. They form the backbone of any emerging economy.

The Government of Rwanda through Rwanda Transport Development Agency (hereinafter referred to as "Client") has planned to improve the state of Ngoma- Nyanza earth road by providing better quality and safer asphalted road to the users in sustainable manner. In this connection RTDA wants to to implement the Upgrading works of Ngoma-Nyanza road.

As per the strategic long-term vision of Government of Rwanda with respect to the improvement, operation and maintenance of road infrastructure in the country, RTDA has identified the need to rehabilitate and upgrade Ngoma-Nyanza road stretch classified as National Road Number 6 (NR 6) to be implemented.

In the framework of LVTP, the project will contribute to an efficient and safe movement of goods and people in accessing and traversing Lake Victoria. The project will boost the traffic with Tanzania, Burundi and Rwanda

This road has an approximate length of 130 km starting from Ngoma roundabout and ending at Gitwe in Ruhango district at the junction with NR7. The administration and execution of the work will be carried out in close collaboration of these statutory bodies and the RTDA, which will grant the authority to contractor the work execution. In order to contribute towards sustainable development, an Environmental and Social Impact Assessment (ESIA) is necessary for the proposed road construction. The ESIA is one of the normal planning requirements under Rwanda environmental organic law, 2005, also one of the stipulated requirements of the co-financing of investment measures of this nature.

1.1 Objectives of the Project

The main objective would be to alleviate the current unsafe conditions of the existing Nyanza-Ngoma road network connecting the villages and cities by providing better quality and safe roads to the users in a sustainable and environment friendly manner.

The Nyanza-Ngoma Road is being developed by the RTDA, which will also provide a by-pass route between the East and the South Provinces, thus avoiding the long and congested streets in the Kigali city centre.

1.2 The Purposes and objectives of the study

This ESIA forms an integral part of any planning process of road project and this applies to the present Ngoma-Nyanza road project as well. ESIA has also been made a mandatory requirement for large scale and environmentally sensitive development projects by environment organic law **N° 04/2005** of Rwanda. It is an important tool for integrating the objectives of environmental management with the requirements of economic growth and social development.

The ESIA serves as a valuable tool for eliminating or mitigating the undesirable effects of contemplated actions on the environment by appropriate modification in the planning, designing, construction and operational phases. Environmental assessment presents a clear and concise picture of the benefits and cost in terms of natural and cultural assets as well as social values associated with alternate courses of action. It is indeed the most valuable, interdisciplinary and objective decision making tool with respect to alternate routes for development, process technologies and project sites.

The purpose o this ESIA are to provide information for decision making on the Environmental consequences of proposed Ngoma-Nyanza road construction, and to promote environmentally sound and sustainable development through the identification of appropriate enhancement and mitigation measures to adverse impacts.

Short term Objectives of the study are

i. To protect the human health and safety;
ii. To avoid irreversible changes and serious damage to the environment;
iii. To safe ground valued resources, natural areas and ecosystems;
iv. To enhance the social aspects of the proposed Ngoma-Nyanza road project.

Long Term Objectives

i. To improve the environmental design of the proposed Ngoma-Nyanza road project;
ii. To ensure that resources are used appropriately and efficiently;
iii. To identify appropriate measures for mitigating the potential impacts of the proposed project;
iv. To facilitate inform decisions making, including settings of the environmental terms and conditions for implementing the proposed Ngoma-Nyanza road project.

1.3 Project Developer

The Ministry of Infrastructure (MININFRA) through Rwanda Transport Development Agency is the Promoter of this project. Under the ministry of Infrastructure, RTDA is responsible for managing all day-to-day aspects of the transport sector in Rwanda.
The Ministry of Infrastructure (Mininfra) is one the I2 Ministries of the Government of Rwanda. It has as mission to ensure the sustainable development of infrastructure and contribute to economic growth with a view to enhancing the quality of life of the population.
For the transport sector, the Ministry has the following specific objectives:

- Reduce and control transport costs
- Assure the quality and durability of the rural, urban and international transport network
- Improve safety for goods and passengers on the principle modes of transport
- Increase mobility of the population in order to improve access to essential services, education, and employment
- Establish a system to ensure sustainable financing of road maintenance
- Facilitate access to cost effective transport services

1.4 The Author

Eco Design & Protection (ED&P) Ltd conducted this Environmental and Social Impact Assessment (ESIA).

ED&P Ltd is a local multi disciplinary environmental consultancy firm headquartered in Kigali-Rwanda. The firm has been involved in providing institutional assessment, Training and Capacity Building in ESIA, socioeconomic assessment, waste water treatment design, environmental assessment and management services in sectors ranging from roads construction, renewable energy development, gas extraction and exploitation, hydropower development, mining exploitation, small and large scale manufacturing industries, erection of telecommunication towers, petrol station construction, agriculture, irrigation projects,..Etc.

The firm is a privately limited company that was established in 2008 and has grown steadily and intends to forge a solid reputation in the East African Region. The firm has an excellent and successful reputation of collaborative networking with local and international firms with worldwide experience. ED & P is dedicated to building relationships based on mutual trust in order to bring the best services possible to the clients.

The company consultants have been contracted by International organisations to provide technical backstopping to various projects in Rwanda. These include the African Development Bank, the World Bank, the one UN, the United Nations Environment Programme, the United Nations Economic Commission for Africa, the United Nations Industrial Development Programme, the United Nations Education, Scientific and Cultural Organization, the United Nations Development Programme,..etc. The consultants are closely working with the government institutions among them, the Ministry of Infrastructure, the Ministry of Agriculture, the Ministry of East African Community, the Ministry of Natural Resources, Rwanda Environment Management Authority and the Rwanda Development Board.

1.5 Project location

The proposed project is located in Ngoma, Bugesera and Nyanza Districts. The road is an existing earthen road and branches off from the main Kigali-Ngoma road at Ngoma Prison and passes through various trading centres in Ngoma, Bugesera and Nyanza Districts. The section of the road from Ngoma to the main road Kigali-Nemba is an earth road that is marked by low lying terrain lying between small hills and reclaimed or semi reclaimed marshland. The section of the road from the junction with Kigali-Nyamata-Nemba is asphalted. The other section, which starts at the main road and moves on through Gako military domain all the way to Nyanza District, is also earth road.

In general, the road is in a motorable status. However, sections of the road cut across the area and bridges that are damaged and are unstable for heavy vehicular loading and in some sections the width of the road is narrow at about 3 m.

The upgrading works entail light and heavy excavation, gravelling, reconstruction, light grading and improvement of drainage structures and reconstruction of the bridges**.** The main output of the work is a motorable standard engineered and asphalted road, road cross drain comprising of culverts and perforated drifts. The geometrics of the existing road will also be improved by widening of the existing horizontal curves and improvement of vertical curves. The actual construction is expected to take two years.

1.6 Scope and methodology of ESIA

1.6.1 Project influence area

In order to formulate the scope of ESIA the spatial and temporal boundaries of the project has to be established. These have been explained in the subsequent paragraphs.

Spatial boundaries

a) Direct area of influence

The proposed ROW is the primary boundary defining the area within which all construction and operation stage activities will be contained. All building structures and trees within this zone will be removed to facilitate construction of the road. The utility lines will be shifted to the outer edge of the proposed ROW to the utility corridor.

In order to reduce the removal of adjacent building structures in heavily built up stretches the proposed ROW has been reduced to the extent possible by introducing relatively expensive methods such as provision of concrete drains and retaining structures.

The road construction material sourcing areas also were considered and all direct and indirect impacts were identified with in mind the proposition of adequate enhancement and mitigation measures.

b) Indirect area of influence

A distance of 10 km on either side of the corridors was used to define the indirect area of influence. Within such area of indirect influence environmental features that are important in a regional scale and have perceivable linkages with the project roads, such as surface waters and wetland areas forests, archaeological and cultural sites were considered.

1.6.2 Temporal boundaries

The project implementation period and start of operation are two important periods in terms of environmental impact and management. These boundaries are defined as follows:

a. Project preparation stage

Project preparation stage involves feasibility study, planning and design stage of the project. The work involved pavement design, road design, and design of structures and environmental and social impact evaluation of the project.

b. **Construction Period:**

The expected construction period is 24 months for the project. In the discussion of environmental assessment, this period will be referred to as the construction phase.

c. Operational Period:

The discussion of Environmental Assessment refers to the general time periods when the asphalted Ngoma – Nyanza road will be made operational in the future, which is expected to be design period of the road.

1.6.3 Scope of EIA

The scope of this ESIA study is based on the legal requirements as per the REMA's EIA guidelines, 2006, under the Environmental Organic Law, 2005 and the World Bank Operation Policies. At the planning stage of Technical Design, environmental screening of the project

road was undertaken in detail to assess the environmental issues involved in implementation of project at each and every chainage points.

The proposed strengthening/reconstruction of the road falls under impact level III (category 3) of projects in the Ministerial Order, 2008 that requires Environmental and Social Impact Assessment (ESIA) to be carried out. The project will be implemented in line with the applied regulation and thus the ESIA will be conducted in accordance to the REMA guidelines Environmental Impact Assessment for any development projects.

In addition to the above, the operational policy OP 4.01 of the World Bank and laws related to environmental management and pollution control in Rwanda were followed. The legal procedures on land acquisition; tree felling, compensatory afforestation and preparation of rehabilitation and resettlement plan were also followed while preparing this project document.

Scoping was done to prepare a list of environmental parameters (ToRs) to be studied for preparation of this EIA report. On the basis of such an exercise detailed EIA study was conducted throughout the road corridor to identify and record impacts in detail along with mitigation measures.

Public Consultation perceived positive and negative impacts of the Project and other environmental and social issues of the Project area. Community consultations and focus group discussions were organized in order to collect views and concers from the stakeholders. Consultations were organized by the study team at few locations along the road corridor. The locations include sector's offices, district offices and any agreed area at village level.

The views and concerns from the different stakeholders were correlated to mitigation measures of related impacts. Those mitigation measures were integrated in the project ESMP.

1.6.4 Methodology of EIA

The Environmental Assessment exercise of the Ngoma – Nyanza Road project was conducted through the following steps:

- Review of Background Information/policy guidelines/legal documents,
- Collection of Secondary Information/data, data entry and analysis with Statistical Package for Social Scientists (SPSS).
- Use of findings of Environment Screening exercise undertaken in the Feasibility stage,
- Socio-economic survey at households level in order to have socio-economic status of the PAPs and details on dispacement; land to be acquired and assets/business to be lost
- Generation of environmental baseline data through surveys,
- Community Consultation – Public Participation and views, suggestions,
- Assessment of Impacts; Environmental, Wildlife and Social with impact matrix
- Preparation of Mitigation and Enhancement Measures and ESMP
- Cost estimation to server as inputs for Economic Evaluation of the project
- Development of an ESMP and Land Acquisition Compensation estimate including budget estimates for mitigation and RAP and monitoring measures.

A basis for this study was intensive field surveys conducted by the environmental and socio-economic experts to describe the baseline conditions. In a first survey, the socio-economists inspected the proposed sites special focus on possible social impacts mainly related to

conflicting use interests and potential resettlement needs. There are some cases of displacement of affected people and expropriation of land and payment for disturbances (e.g. damages to crops) carefully analysed trying to quantify them as accurately as possible.

Experiences from other projects in Rwanda concerning road construction were incorporated and compared to crosscheck baseline, institutional and legal frameworks as well as procedures.

The transparent evaluation procedure is based upon the consultant's experience over the years in performing Environmental and Social Impact Assessments (ESIA) and has proven to be a reliable method for assessing a project's impacts on the environment. It includes identification, prediction (e.g. duration, intensity, severity, status, reversibility of the impact) and evaluation of the significance of impacts based on legal requirements.

Wherever possible, impacts are quantified. The focus of the used evaluation procedure is to decide whether the Project is likely to cause significant adverse environmental effects resulting from the construction and operation of the Project.

For the purpose of a transparent presentation and evaluation, a tabulated evaluation matrix is applied. On the basis of a point scale, the severity of the particular environmental impact together with its general trend - that is negative or positive - is described.

For the judgment, international standards like standards from the World Bank, JICA, WHO, IFC etc. are used as well as national standards of Rwanda. According to these standards the evaluation of impacts is done as provided in Table 1.

Table 1-1: Evaluation of Impacts using National and International Standards

Extent of impact	Reason
High	International and national standards are exceeded
Medium	Between international and national standards, international and national standards are barely met
Low	International and national standards are met

Limitations of the study

Limtitations of the study are mostly related to the availability of secondary data during the data collection process. Much of available data are not updated, they include data on water quality, air quality and data on flora and fauna in the zone of influence. There are also some discrepancies while comparing the availabile seondary data and primary data. Some PAPs were not willing to provide important information, especially on households economic status.

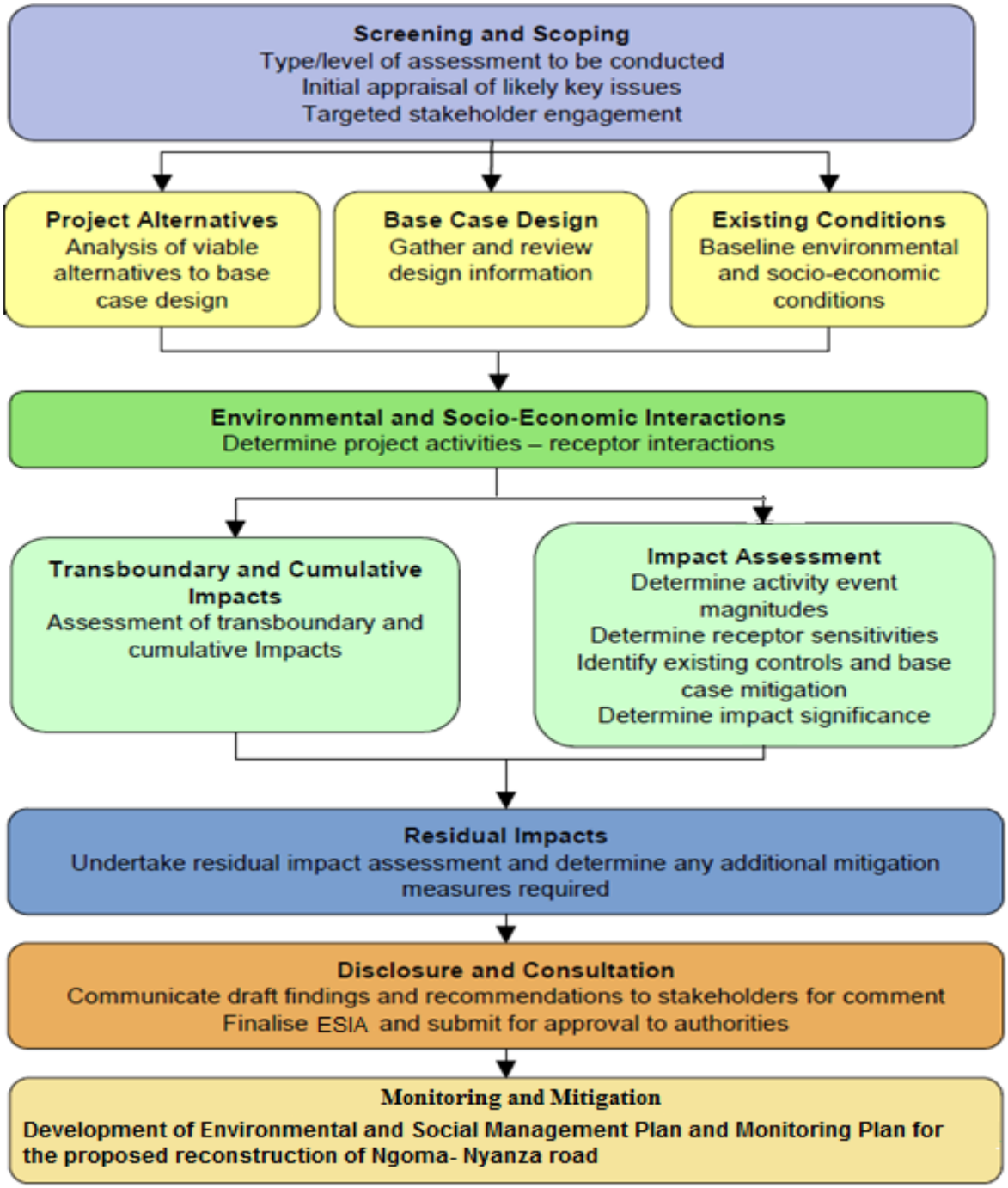

Figure 1-1: Methods of Ngoma - Nyanza Road project Environmental and Social Impact Assessment Preparation.

2. Policy, Legal and Institutional Framework

2.1 Relevant legislations

2.1.1 Constitution of Rwanda

It should be noted at the outset that, all laws and regulations in Rwanda must be aligned with principles in the Constitution. The Rwandan Constitution was approved in a national referendum and adopted in Parliament on 25th December 2015. It defines the principles and overall legal framework for the management of the water, energy and agricultural sector. According to the Constitution of the Republic of Rwanda in:

Article 3: Supremacy of the Constitution
The Constitution is the supreme law of the country.
Any law, decision or act contrary to this Constitution is without effect.
Article 21: Right to good health
All Rwandans have the right to good health.
Article 22: Right to a clean environment
Everyone has the right to live in a clean and healthy environment.
Article 23: Respect for privacy of a person and of family
Article 34: Everyone has the right to private property, whether individually or collectively owned.
Private property, whether owned individually or collectively, is inviolable.
The right to property shall not be encroached upon except in public interest and in accordance with the provisions of the law.
Article 35: Private ownership of land and other rights related to land are granted by the State. A law determines modalities of concession, transfer and use of land.
Compliance aspects
The project must be implemented while considering:

- The provisions of the constitution are above any other law that will be used in reference
- The project will be implemented in a context of environmental sustainability, ensuring all environmental impacts are mitigated to ensure a clean environment to the parties supposed to be affected
- The parties that have land rights will be faily compensated in consideration of the right to private property.

2.1.2 Other relevant laws

Table 2-1: Key environmental laws of Rwanda and compliance aspects

Law	Institution and Date of adoption	Key areas
Constitution of the Republic of Rwanda, 2003	GoR, 2003	The Constitution of the Republic of Rwanda as promulgated in 2003 makes clear the requirement for equitable and participatory development for all citizens of the country, and makes quality and healthy environment as a basic right with every citizen required to protect, safeguard and promote a healthy environment. In this regard there are principally two articles among other

Law	Institution and Date of adoption	Key areas
		provisions that are basis for environment regulatory framework as detailed below: Article 45 of the constitution states that all citizens have the right to participate in government of the country, whether directly or through freely chosen representatives in accordance with the law. All citizens have the right of equal access to public service e.g. Roads in accordance with their competence and abilities. Article 49 states that every citizen is entitled to a healthy and satisfying environment. Every person has the duty to protect, safeguard and promote the environment.
Environmental Organic Law N° 04/2005	MINIRENA , REMA 2008	Determines the modalities of protecting, conserving and promoting the environment in Rwanda. Land in Rwanda is categorized into two: Individual land and Public land. The later is subdivided into two categories: the state land in public domain and the state land in private domain. State land in public domain includes national land reserves for environment conservation; land over which administration building are erected, state roads, land containing lakes, rivers, stream and springs. State land in private domain include swamps that may be productive in terms of agriculture, vacant land with no owner, land purchased by the State, donation, land acquired through expropriation and land occupied by state owned forests.

Law	Institution and Date of adoption	Key areas
Law N° 32/2015 of 11/06/2015 relating to expropriation in the public interest	MINALOC, RNRA 2015	Determines the procedures relating to expropriation in the public interest. Only Government order expropriation in the public interest. Article 4 stipulates that: Every project, at any level, which intends to carry out acts of expropriation in the public interest, shall budget for valuation of the property of the person to be expropriated and for fair compensation. Article 17 on value of activities developed after the publication of the decision of expropriation in the public interest stipulates that: After the publication of the decision on expropriation in the public interest and the list of holders of rights registered on land titles and property incorporated on land, the landowner shall not develop any other long-term activities on the land. Otherwise, such activities shall not be compensable during expropriation. Article 36 stipulates: The approved fair compensation shall be paid within a period not exceeding one hundred and twenty (120) days from the day of its approval by the District or City of Kigali Council or the relevant Ministry. If fair compensation is not paid within the period provided under Paragraph One of this Article, expropriation shall become null and void unless otherwise agreed upon between the expropriator and the person to be expropriated. Subsequent to receiving fair compensation, the expropriated person shall have a period not exceeding one hundred and twenty (120) days to relocate.
The Land Law N° 43/2013 of 16/06/2013	MINALOC, MINIRENA , 2013	The section 3, article 12 of the law on State Land Sub-section one stipulates that State land which makes up the public domain consists of all the land meant to be used by public or land reserved for organs of state services as well as national land reserved for environmental protection. This is to say among others: 5° State roads and their boundaries which were listed by the order of the Minister having infrastructure in his or her attributions;
The Law n°42/2015 of 29/08/2015 governing roads	MININFRA, RTDA 2015	The law governing roads in Rwanda regulates the road network in Rwanda and determines its reserves, classification and management. Article 1 of this new law on road reserve for national

Law	Institution and Date of adoption	Key areas
in Rwanda		roads, Districts and City of Kigali roads and those of other urban areas stipulates that: Article 22 of the Law n° 55/2011 of 14/12/2011 governing roads in Rwanda is modified and complemented as follows: "The road reserve for national roads and District roads, Class 1, shall be delimited by two (2) parallel lines at twenty-two (22) meters on both sides of the road from its median line. The road reserve for District roads, Class 2, shall be delimited by two (2) parallel lines at twelve (12) meters on both sides of the road from its median line. Article 6 of the Law 2011 and not amended stipulates that: • The management and maintenance of the National Roads shall be under the jurisdiction of the Rwanda Transport Development Agency. • The District or the City of Kigali has the responsibilities as regards to the routine maintenance of the part of the national road passing over it and its surroundings. Artcle 12 **of the Law 2011 and not amended** stipulates that • The Governement shall identify and provide a quarry for road construction and maintenance materials extraction. • Any person, to whom a permit for extracting construction materials is issued, shall carry out extraction works in accordance with the relevant laws.
Law N°62/2008 of 10/09/2008	MINIRENA, RNRA 2008	Puts in place the use, conservation, protection and management of water resources regulations. Stipulates the modalities of protecting and appropriately using water resources, in the natural balance respect, as they are of general interest and constitute an imperative duty for all, notably the State, the local communities, private sector, civil society and citizens.

Law	Institution and Date of adoption	Key areas
Ministerial Order determining the length of land on shores of lakes and rivers transferred to public property - N° 007/16.01 of 15/07/2010	MINIRENA REMA 2005	Determining the length of land and shores of lakes and rivers. The land within a distance of ten (10) meters from the big riverbanks is public property The land within a distance of ten (50) meters from the lakeshore and the land on the river shore within the distance referred to in Article 3 are reserved as natural vegetation
Law No.17/2010	MINALOC	Establishing and Organizing the Real Property Valuation Profession in Rwanda
Laws N° 005/2008 and N° 007/2008 of August 15th, 2008	MINIRENA REMA 2008	Ministerial orders establishing respectively modalities of inspecting companies or activities that pollute the environment and the list of protected animal and plant species
Laws N° 003/2008 and N°004/2008 of August 15th, 2008	MINIRENA REMA, RDB	Ministerial orders specifying respectively the requirements and procedure for environmental impact assessment and the works, activities and projects that have to undertake an environment impact assessment. Developed to operationalize the provisions of the Organic Law to make EIA mandatory for all development projects and they aim to serve agencies and individuals taking part in the EIA process.
Law No. 001/2006 of 26/09/2006	MINIRENA RNRA September, 2006	Ministerial Order determining the structure of Land Registers, the responsibilities and the functioning of the District Land Bureau
Law	**Compliance aspects**	
Environmental Organic Law N° 04/2005	**This applies in all aspects of the intervention project including among others;** ❖ Waste management. Will apply on disposal of solid wastes into the environmental without complying with the established standards and procedures. Requires all time compliance; ❖ Aerial emissions, ❖ Effluent discharge practices ❖ Excessive noise and vibrations ❖ Social disruption control ❖ Excavations and soil loss	

Law	Institution and Date of adoption	Key areas
		❖ Adverse interference with natural resources including wetlands and water resources ❖ The developer and the contractor on the ground will closely work with local authorities and environmental committees existing at different levels ❖ The EIA report will be submitted to RDB for review and the developer will work closely with REMA, being the environmental authority ❖ The project cycle should ensure compliance with this statute all the time.
Law N° 32/2015 of 11/06/2015 relating to expropriation in the public interest		❖ An ESIA study was prepared indicating how significant is the economic and physical displacement and compensation needed before the upgrading activities of the road starts ❖ A RAP was prepared indicating the list of holders of rights registered on land titles and property incorporated on land ❖ The plan of implementing the RAP ❖ The plan for management of grievances Minutes of consultative meetings that were held in the three districts Ngoma, Bugesera, and Nyanza detailing that the concerned population was sensitized about the importance of this public interest project.
Land law N° 43/2013 of 16/06/2013 Governing land in Rwanda		Road reserve considered as public domain will be clearly identified with clear boundaries.
The Law n°42/2015 of 29/08/2015 governing roads in Rwanda as per the amended law n°55/2011 of 14/12/2011		❖ It is recommended the Districts and RTDA on behalf of the government assists the contractor for identification and provision of quarries for this Ngoma - Nyanza road construction. The contractor should seek for environmental approval before extracting the materials from the quarry as stipulated by the organic law on environmental protection
Law N°62/2008 of 10/09/2008		Established buffer zones will be respected to ensure protection and conservation of water resources. Monitoring the threshold of different parameters as per the established standards of relevant parameters
Ministerial Order N°007/16.01		This applies in all aspects of the intervention project including among others; - Encroachment into new wetlands not permitted - New buffer zones for big rivers, lakes and wetlands are not to be encroached

Law	Institution and Date of adoption	Key areas
Law No.17/2010	Updated census done by certified values. These later are the one to be used for the expropriation and compensation	
Laws N° 005/2008 and N° 007/2008 of August 15th, 2008	Polluter pay principle to be respected an enforced. Protected animal and plant species identified by relevant experts	
Laws N° 003/2008 and N°004/2008 of August 15th, 2008	EIA practices must be professionalized and an institutional framework established from the screening and approval of all projects	

2.2 Relevant policies

Table 2-2: Key environmental policies of Rwanda

Policy	Institution and Date of adoption	Key areas and compliance aspects
National Environment Policy	MINIRENA, REMA, RDB November 2003,	The overall objective is the improvement of people's wellbeing, the judicious utilization of natural resources and the protection and rational management of ecosystems for sustainable and fair development. Sets out specific objectives as well as fundamental principles for improved management of environment, both at the central and local level, in accordance with the country's current policy of decentralization and good governance. Integrates environment aspects in all development policies, programmes and planning for all works, activities and projects at national, district and local levels with total participation of the population.
Transport policy	MININFRA RTDA December, 2008	The transport sector policy is inspired by the planning tools available in Rwanda, such as the Vision 2020, the Economic Development and Poverty Reduction Strategy (EDPRS), the National Investment Strategy and the Medium Term Expenditure Framework. The Global Objective of the sector in the medium term is to reduce constraints to transport in order to promote sustainable economic growth and contribute to poverty reduction. It is centered on reducing transport costs, increasing mobility for the population, and the supplying of services and transport infrastructure that will facilitate

		the exchange of goods and services and allow the entire population to improve their standard of life.
National Land Policy, February, 2004	MINIRENA, RNRA	Puts emphasis on appropriate land administration systems as a key element of land tenure security by providing the possibility of registering and transferring land and also the possibility of investment in land. Highlights key principles of appropriate land use and land management.
National Water Policy	MININFRA, EWSA	The mission is to create favorable conditions for fair and sustainable access for the population, men, women and children, to water and sanitation infrastructure and to the development of natural resources. The overall objective of the sector policy is to improve the living conditions of the population through optimal use of water resources and access of all to water and sanitation services.
Health Sector Policy	Ministry of Health	One of the objectives of Rwanda Heath Sector Policy is to improve the quality of life and demand for services in the control of disease. The policy identifies the most common illnesses as a result of unhealthy living or working environment. The health sector policy required for the proposed infrastructure subprojects emphasis is put on ensuring quality environment and environmental control of the disease vector especially in marshland areas.
National Forest Policy	MINIRENA 2004	Established Provincial Forest Commission to promote and oversee forestry activities, which meet, on a sustainable basis, the population's needs for wood and other forest products and services. The main targets are forest cover to comprise at least 30 % of the national territory and to have at least 85 % of farmland under agro-forestry by 2020.
Rwanda Biodiversity Policy	MINIRENA 2004	Rwanda has ratified the Convention on Biodiversity and has the obligations related to: -Establishing a system of protected areas, rehabilitating and restoring degraded ecosystems and promoting the recovery of threatened species; -Identifying and controlling all potential sources of adverse impacts on biodiversity, and carrying out environmental impact assessments of projects likely to have "significant adverse effects" on biological diversity
National Policy of Decentralization	2006, MINALOC	Recreated Districts, sectors and cells to include environmental and land officers within the District organogram to help with planning and coordination of environmental and land management activities at District levels.
MDGs and		The transport sector policy matches perfectly with the

SSATP		eight Millennium development objectives, as it aims at economic growth and reduction of poverty by way of developing infrastructure and transport services in rural and urban areas and reducing transport costs. Ngoma-Nyanza road project will make it possible to improve access to all essential services such as health, education, employment, as well as markets for the facilitation of trade.
SDGs in Rwanda	Minecofin Mininfra	The Ngoma-Nyanza upgrading project comes to address some the 17 goals the world and Rwanda will use over the next 15 years to end extreme poverty, fight inequality and injustice, and fix climate change. Most of the positive impacts of Ngoma-Nyanza road are socio-economic but they cover the three dimensions, social, economic and environment. Population growth, migration and urbanization trends demand an increase in infrastructure development, especially in emerging economies and developing countries. Transportation infrastructure— such as Ngoma-Nyanza road is key for people of EAC region and Rwanda's mobility from home to work, and for connecting rural areas to domestic and regional markets, contributing to EAC and Rwanda's economic development. Among the SDGs to be implemented and achieved: SDG 9—Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation SDG 1—*end poverty in all its forms everywhere* SDG 2—*end hunger, achieve food security and improved nutrition and promote sustainable agriculture* SDG 5—*achieve gender equality and empower all women and girls* SDG 6—*ensure availability and sustainable management of water and sanitation* SDG 11—*make cities and human settlements inclusive, safe, resilient and sustainable* SDG 12—*ensure sustainable consumption and production patterns* SDG 13—*take urgent action to combat climate change and its impacts*
Rwanda Green Growth and Climate Resilience	MINIRENA RNRA REMA	As for the road transport, climate Resilience / Adaptation is based on the reality that Rwanda has a robust road network. Rwanda at 0.56km/km2 has one of the densest road networks in Africa. As the dominant mode of transportation, all sectors – agriculture, mining, industry and services – and therefore the economy relies on this road network. These roads vary in quality, from

		tarmac highways to dirt tracks. The poor quality roads have a detrimental effect on the economy, contributing to a large proportion of food produce being lost during transit to market. The majority of the network is also unprepared for current weather events, let alone future variations due to climate change. Thus the entire economy is vulnerable to the effects of climate change. Building and maintaining the roads in a way that is not only suitable for the value of the route, but also resilient to more extreme weather events, will reduce Rwanda's vulnerability and promote economic development, particularly in rural areas.
Vision 2020 and EDPRS II	Minecofin Mininfra	This policy shall enable the establishment of a viable transport sector, which will be capable of addressing its current and future shortcomings and shall contribute to significant growth and economic development of Rwanda in order to achieve the development objectives that are set out in the EDPRS II and Vision 2020 for the benefit of the Rwandan people.

2.3 Conventions and treaties ratified or signed by the GoR

Rwanda has taken further steps to respect his commitment in the environment and natural resources management areas. Rwanda is an active participant in major international multilateral conventions relating to environmental governance, most notably the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention to Combat Desertification and Drought (UNCDD).

Table 2-3: Conventions or treaties ratified or signed by the GoR

Conventions or Protocol, Date of signature and Date signed/ratified by GoR	Overview	Relevance to Project
International convention on biological diversity and its habitat signed in RIO DE JANEIRO in BRAZIL, June 5th, 1992 Ratified by Presidential Order N° 017/01 of March 18th, 1995	The Convention on Biological Diversity (CBD) is an international legally binding treaty with three principal goals: conservation of biological diversity (or biodiversity); sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources. Principle No. 10 of the declaration underscore that environmental issues are best handled with participation of	Issues pertaining to biodiversity conservation and sustainable natural resource management are fully applicable to the Project and undergo assessment specifically within Chapter 7.
CARTAGENA protocol on biosafety to the convention of biological biodiversity signed in Nairobi and in New York, Nairobi from May 15, to 26, 2000 and in New York from June 5, 2000 to June 4, 2001 Law N°38/2003 of		

Conventions or Protocol, Date of signature and Date signed/ratified by GoR	Overview	Relevance to Project
December 29th, 2003 London (1990) and Copenhagen Amendments to the Montreal Protocol (1992), KYOTO protocol to the framework convention on climate change, March 06th, 1998, Law N° 36/2003 of December 29th, 2003	all concerned citizens at all the relevant levels. At the national level, each individual shall have appropriate access to information that is concerning environment that is held by public authorities. States shall encourage and facilitate public participation by making information widely available. The Kyoto Protocol (a Protocol to the UN Framework Convention on Climate Change (UNFCCC)) aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.	The Project will comply with all national standards for GHG emissions in order to contribute to Rwanda targets set in line with the adoption of the Kyoto Protocol.
BASEL convention on the control of transboundary movements of hazardous wastes and their disposal, May 22nd, 1989 Presidential Order N° 29/01 of August 24th, 2003	The Basel Convention was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries. It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.	The Project will comply with all national and international standards for hazardous waste generation and management. Issues pertaining to hazardous waste generation are applicable to the Project and are addressed in Chapter 7.
MONTREAL international convention on substances that deplete the ozone layer, 1987	The Montreal Protocol (a Protocol to the Vienna Convention on Ozone	Through limitation of the release of CO_2 containing ozone-

Conventions or Protocol, Date of signature and Date signed/ratified by GoR	Overview	Relevance to Project
Presidential Order N° 30/01 of August 24th, 2003	Layer Protection) is designed to protect the ozone layer by phasing out the production of numerous ozone depleting substances.	depleting substances, the Project will support Rwanda's contribution toward the anticipated recovery of the ozone layer.
Convention Concerning the Protection of World Cultural and Natural Heritage (1972)	The Convention Concerning the Protection of World Cultural and Natural Heritage is the precursor to the establishment of UNESCO World Heritage Sites as a place (i.e. natural or built environment) that is listed by the UNESCO as of special cultural or physical significance.	Rwanda has UNESCO World Heritage Sites. However, the Project will have no interaction with these. As such, requirements under the convention will not be triggered.
RAMSAR international convention on wetlands of international importance, especially as waterfowl habitats, February 2nd, 1971 Law N° 37/2003 of December 29th, 2003	Formally known as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat, the Ramsar Convention is an international treaty for the conservation and sustainable utilisation of wetlands.	Akagera wetland was proposed RAMSAR site but at the present not listed as such. Of biodiversity importance, it is one of the last wetlands remaining within the Bugesera. As such, potential Project interactions are discussed in Section 7.3.
BONN Convention on conservation of migratory species of wild animals, June 23rd, 1979 Law N° 35/2003 of December 29th, 2003	The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range.	Issues pertaining to Project interactions with migratory species undergo assessment within Chapter 5.
Washington agreement on international trade in endangered species of Wild Flora and Fauna, March 3rd, 1973	The aim of Convention on International Trade of Endangered Species of Flora and Fauna ('CITES') is to ensure that international trade	Issues pertaining to biodiversity conservation are fully applicable to the Project and undergo

Conventions or Protocol, Date of signature and Date signed/ratified by GoR	Overview	Relevance to Project
Presidential Order N° 211 of June 25th, 1980	in specimens of wild animals and plants does not threaten their survival.	assessment within Chapter 7.

However, the ratification and implementation of the above conventions and protocols were very limited up to 2003, as the policy documents on environment were scattered and defined only the management sector of some fields where environment was taken into consideration. The environmental issues were in the portfolio of the Ministry of Agriculture (MINAGRI). Since 2003, most of the sectoral policies and legislation on environment and natural resources have been under review, environmental policies and laws have been repealed and new ones enacted in line with the Constitution of 2003.

As part of the implementation of the Rio Conventions, the GoR developed National Strategies and Action plans for each convention viz: the National Biodiversity Strategy and Action Plan (NBSAP) 2003, National Plan of Action (NAPA) for climate change adaptation, 2006/7, and National Action Plan (NAP) for combating desertification. These strategies and action plans reflect national priorities for ENR sector that are online with the Rwanda's second phase Economic Development and Poverty Reduction Strategy (EDPRS II) as a medium-term framework for achieving the country's long term development aspirations as embodied in Rwanda Vision 2020, the seven year Government of Rwanda (GoR) programme, and the Millennium Development Goals (MDG) priorities.

In addition, Rwanda participates in regional initiatives related to environment protection and management as the Nile Basin Initiative and the Lake Victoria Biodiversity Programme.

2.4 Institutional Framework

2.4.1 Ministry of Infrastructure and RTDA

The main institutions in road development are the Ministry of Infrastructures (MININFRA) and Rwanda Transport Development Authority (RTDA) as a public institution. MININFRA is responsible for policy development, advisory and monitoring.

RTDA is the national company responsible for developing and maintenance of road infrastructures at national level including the development basis.

RTDA is the project proponent and attaches great importance to the environmental issues and embraces principles of sustainable development in all its undertakings. Rehabilitation and reconstruction of the proposed Ngoma-Nyanza road will have impacts on the environment whether beneficial or adverse. However, RTDA believes that what is cardinal is to systematically identify all potential impacts and put measures in place aimed at either minimizing to required level or enhancing impacts through an elaborated Environmental Management and Monitoring Plan that covers all stages of project development. Specifically, RTDA will ensure that it abides by the following principles in line with national environment policy and regulation.

2.4.2 MINIRENA, REMA and RNRA

The position of environment in the overall national governance framework in Rwanda has become more prominent with successive institutional reforms. The environmental Sector is a crosscutting subject within different Rwanda Government institutions. At the institutional level, the Ministry of National Resources (MINIRENA) is the Ministry responsible for formulating the policy related to environment. It ensures the follow up and evaluation of policies, strategies as well as environment protection and draft bills and establishes norms and practices for rational exploitation and efficient land management, environment, water resources and evaluate their implementation.

Rwanda Environment Management Authority (REMA), created by law N° 16/2006 of 03/04/2006, is the official organ in charge of implementing this policy. It coordinates and oversees all aspects of environmental management for sustainable development. Even though the agency is under the ministry of Natural Resources, it has a legal status of financial and administrative autonomy.

Rwanda National Resources Authority (RNRA) is an authority under the Ministry of Natural Resources that heads the management of promotion of natural resources, which is composed of land, water, forests, mines and geology. It is entrusted with supervision, monitoring and to ensure the implementation of all issues relating to promotion and protection of natural resources.

RNRA coordinates and supervises activities of its three agencies, which are: National Land Commission (NLC), which approves the expropriation proposal, Mines and Geology and Integrated Water Resources Management (IWRM).

2.4.3 RDB

The Rwanda Development Board (RDB) brings together all the government agencies responsible for the entire investor experience under one roof. This includes key agencies responsible for business registration, investment promotion, environmental clearances, privatization and specialist agencies, which support the priority sectors of ICT and tourism as well as SMEs and human capacity development in the private sector.

In order to facilitate the investment in Rwanda and to ensure that the proposed development strives towards sustainable development, the Department of Investment and division of Investment Promotion of the RDB coordinates the EIA process and issues the Environmental Clearance Certificates to the Project and validate the EIA project studies.

The article 67 stipulated in the Environmental Organic Law N°04/2005 of 08/04/2005 clarifies the different steps to access the EIA certificate. RDB, in addition to the mandates of administering and supervising EIAs, has also power or responsibility to issue a permit or licence normally referred to, in Rwanda, as EIA Certificate of Authorization.

EIA procedure in Rwanda

EIA studies have the direct benefit of assisting developers to incorporate environmental considerations at the planning phase and to minimize environmental risks and financial costs. Indirect benefits include beneficial circumstances created by the project. EIA is an invaluable tool for environment management in a trans-boundary context. It provides a framework for promotion of efficient decision making in project approval; enables implementation of environmental safeguards to mitigate significant negative impacts, avoid ecological damage and

large-scale irreversible loss of natural resources; plays a role in information dissemination between Rwanda and neighbouring countries and widens the scope of understanding of impacts beyond its borders.

An EIA process in Rwanda includes 5 steps: (1) project application and registration, (2) screening, scoping and terms of reference, (3) EIA study and report, (4) submission of an EIA report, and finally (5) decision making.

Screening enables categorization of projects according to their Impact Level (IL) as follows:

- Category 1 (Impact level IL1): Full EIA not required. RDB advises on the appropriate environmental management measures (plan). The Exercise may take 14 days from the day received the project brief; (days may be less or more depending on the nature of the project);
- Category 2 (Impact level IL2): The proposed projects under this category are screened to determine whether or not a full EIA is needed. In this connection, RDB provides the developer with clear indication of the additional information required. Once this information is received, RDB will determine whether or not a full EIA of the project is needed.
- Category 3 (Impact level 3): Full EIA is required.

Figure below summaries the EIA procedure in Rwanda and duration (working days) corresponding to each stage.

2.4.4 Institutions in charge of implementing the ESMP

The monitoring team and project management (MTPM) will do site supervision. Site supervision is required to optimize the technical organization of the site and the consideration of environmental issues. This team will be composed of:

- A representative of the supervision consultant (HSE),
- A representative of the contractor (HSE)
- A representative of the developer (RTDA)

RTDA/MININFRA will remain the sole institution that will fundamentally be responsible for undertaking monitoring throughout the project phase, when the contactor hands over the project and will be expected to ensure monitoring throughout the project phase until it gets decommissioned.

The contractor and the supervision consultant will ensure they have a full time environmental and social staff on site.

As the lead agency responsible for the protection of environment in Rwanda, REMA will play the leading oversight role of monitoring the activities of the project according to the Organic Law establishing REMA and its functions.

As for the daily and routine monitoring, the contractor should be undertaking the major role of ensuring the mitigation measures in the ESMP are followed to the details. In actual period of rehabilitation of the road, the contactor should be undertaking regular monitoring of all the activities occurring in the project site to ensure compliance to the ESMP.

The involvement of local authorities is crucial for the successful implementation of the ESMP. It is therefore important that the Ngoma, Bugesera, and Nyanza Districts be consulted during the implementation of the ESMP.

The project can obtain maximum benefit if it involves the local communities and spends a small amount of funds on the local communities.

2.4.5 Capacity assessment on implementing and monitoring ESMP

The role and responsibilities during the project implementation and monitoring are described in section 8.2. In order to monitor all the projects being implemented and through different phases, REMA needs more staff, appropriately trained and with required tools. And in order to speed the review process of EIA studies, RDB needs more environmental analysts. For RDTA to ensure all its projects are appropriately managed and monitored, more environmental and soacial eperts are needed.

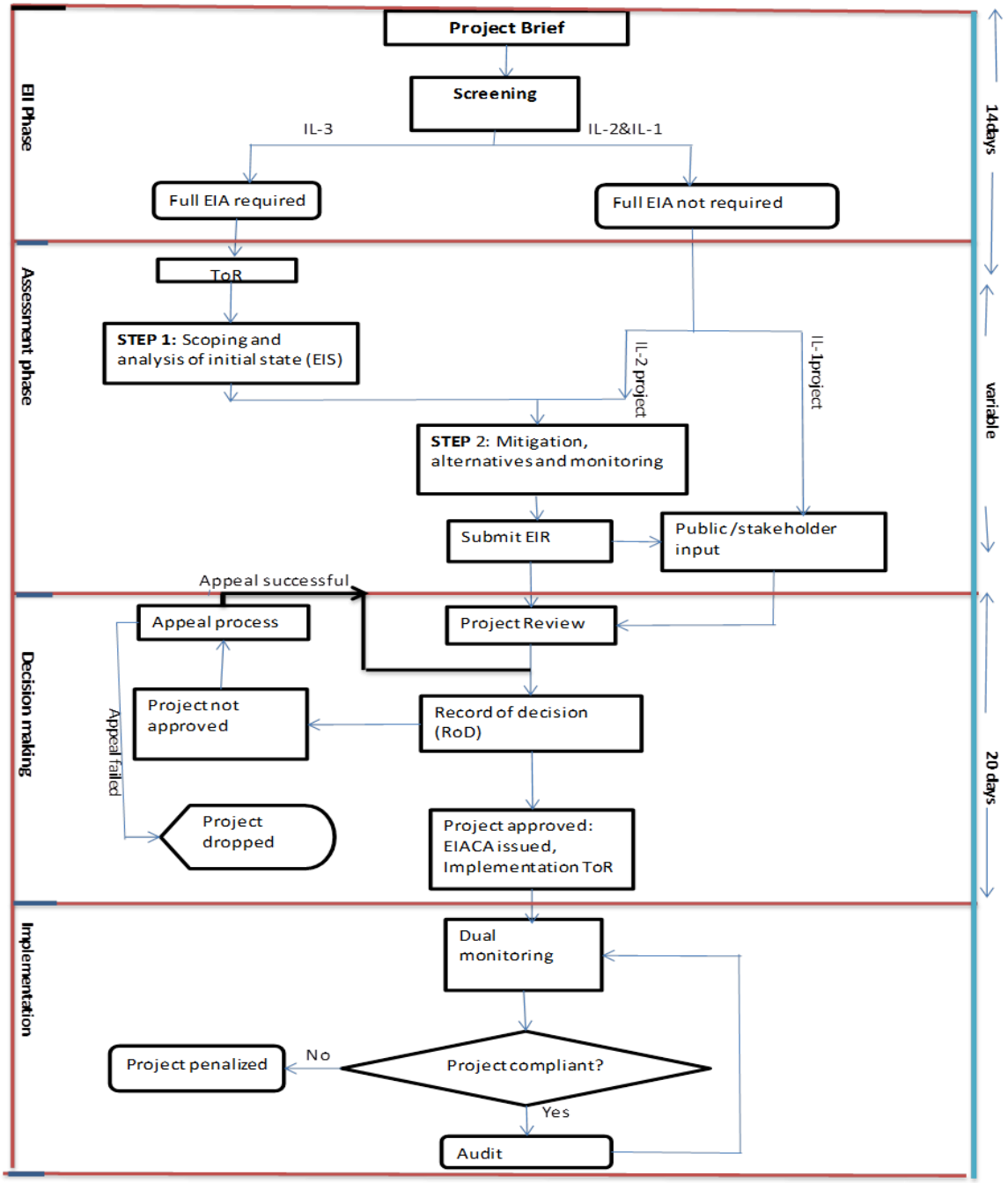

Figure 2-1: EIA procedure and timelines chart (Adapted from REMA, 2006)

Ministerial order N°004/2008 of 15/08/2008 establishes the list of works; activities and projects that have to undertake an EIA (see Table 2-4). They are classified into infrastructure, agriculture and animal husbandry, works in park and in its buffer zones and mine extraction. According to this law, the proposed project is classified in category 3 (IL3), infrastructures, which require a full ESIA study.

Table 2-4: List of projects, activities subject to EIA study in Rwanda

Infrastructure (I)	Agriculture and Animal Husbandry (II)	Works in parks and in its buffer zone (III)	Mining (IV)
Construction and repair of international roads, national roads, district roads and repair of large bridges; Construction of industries, factories and activities carried out in those industries; Construction of hydro- dams and electrical lines; public dams for water conservation, rain water harvesting for agricultural activities and artificial lakes, hydropower; Construction of oil pipelines and its products, gases and storage tanks; terminal ports, airports, railways, car parks; hotels, large public buildings, water distribution network, sanitation; public land fills; slaughter houses; hospitals; stadiums, large markets and initial installation of communication Infrastructures.	Agricultural and breeding activities which use chemical fertilizers and pesticides in wetlands and large scale monoculture Agricultural practices such as tea, coffee, flowers and pyrethrum, etc. Works and activities that use bio-technology to modify seeds and animals	Works in parks and in its buffer zone	Work of mines extraction

2.4.6 Province and District

The article 66 of the Environmental Organic Law specifies that it is established, at the Provincial, City of Kigali, District, Town, Sector and the Cell levels; Committees responsible for conservation and protection of the environment. The organization, functioning and their responsibilities are determined by Prime Minister's Order, Article 15 of the law regulating mine and quarry exploitation in Rwanda.

The executive committee of the District is responsible to initiate the expropriation and District Council implements the expropriation after considering the decision of the Land Commission.

2.5 International Legislations

Rwanda is a signatory to a number of conventions on sustainable development and is a member of various bilateral and multilateral organizations. Some of the relevant development partners in this project are the World Bank, Japaneese International Corporation Agency and a number of United Nations agencies.

2.5.1 World Bank Safeguards Policies

World Bank Operational Policies (OP) and Bank Procedures (BP) Environmental Assessment - BP4.01 and OP 4.01 (January 1999 all of which require environmental assessment of projects proposed that are deemed to have potential adverse impacts to help ensure that they are environmentally sound and sustainable.

Environmental Assessment is one of the 10 environmental, social, and legal Safeguard Policies of the World Bank. World Bank Environment and Social Safeguard Policy aims at improving decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted. In this section, the Bank's safeguards policies and their applicability are discussed. The World Bank Safeguard Policies are:

The World Bank Safeguard Policies are:
1. Environmental Assessment (OP 4.01)
2. Natural Habitats (OP 4.04)
3. Forestry (OP 4.36)
4. Pest Management (OP 4.09)
5. Physical Cultural Resources (OP 4.11)
6. Indigenous Peoples (OP 4.10)
7. Involuntary Resettlement (OP 4.12)
8. Safety of Dams (OP 4.37)
9. Projects on International Waters (OP 7.50)
10. Projects in Disputed Areas (OP 7.60)

The project assessment has revealed a number of WB OP that are triggered by this Ngoma-Nyanza road upgrading project. Those Operation Policies are the following:

Operational Policy (OP)/Bank Procedure (BP)

1. Environmental Assessment (OP4.01, BP 4.01, GP 4.01)

The World Bank's environmental assessment policy and recommended processing are described in OP/BP 4.01.

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

Operational Policy 4.01 further requires that the Environmental and Social Management Plan /ESMP report must be disclosed as a separate and stand alone document by the Government of Rwanda and the World Bank as a condition for bank appraisal of the project. The disclosure should be both in Rwanda where the general public and local communities can access it. The World Bank system assigns a project to one of three project categories, as defined in Table 2-5:

Table 2-5: Categorization of projects to EIA (World Bank, 1999)

Category A	Category B	Category C	Category FI
The project is likely to have significant adverse impacts that may be sensitive, irreversible, diverse, comprehensive, broad or precedent setting. These impacts generally result from a major component of the project and affect the area as a whole or an entire sector. A full environmental assessment is required	Although a full EIA is not always required, some Environmental analysis is necessary. The projects have impacts that are 'less significant, not as sensitive, numerous, major or diverse. Few if any of the impacts are irreversible and mitigatory measures can easily be designed. Typical projects include rehabilitation, maintenance, or upgrades, rather than new construction	No EIA or other analysis is required. The projects result in negligible or minimal direct disturbance of the physical Environment. Typical projects include education, family planning, health, and human resource development	It involves investment of Bank funds through a financial intermediary

The proposed Ngoma- Nyanza reconstruction project has thus been screened as a category B project, which however needs a detailed ESIA, study. This road-upgrading project is defined as rehabilitation and widening of an existing road likely to have adverse environmental impacts on human populations or environmentally important areas including wetlands if mitigation measures are not applied. The EA process has examined the potential negative and positive environmental impacts and recommended measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

2. Natural Habitat (OP4.04, BP 4.04, GP 4.04)

This safeguard policy requires a precautionary approach to natural resources management and requires the conservation of critical environments during project development. In order to ensure conservation and project sustainability, this policy requires that:

Project alternatives are sought when working in fragile environments; and

Key stakeholders are consulted during the project design, implementation, monitoring and evaluation of mitigation.

The road crosses Gako military domain which is qualified as an important natural habitat. It is is however not a national park of Rwanda. This natural habitat won't be impacted by the project as there is available road corridor, for which precautionary measures are needed for the resources management and safety of construction activities.

In addition to the Gako military domain, the road crosses Akagera and Akanyaru wetlands.

Figure 2-2: Ngoma-Nyanza road crossing Gako military domain

Akagera River results from the junction of the rivers of Nyabarongo and Akanyaru but Nyabarongo River is not crossed by Ngoma-Nyanza road proposed to be upgraded.
Akagera wetland complex, out of the national park was proposed to be a RAMSAR site, while Akanyaru wetland was recognized recently as an Important Birding Area (IBA). Akanyaru wetland supports the Malagasy Pond-heron, an endangered species according to IUCN classification. These three natural habitats are in the project area of influence and are hosting important biodiversity including IUCN/CITES species.
Nyabarongo originating from Nyungwe forest flow to the noth-west and then South-east where it forms the main tributary of the Kagera River, its wetlands are not crossed by Ngoma-Nyanza road to be upgraded.

3. Physical Cultural Resources (OP4.11, BP 4.11, GP 4.11)

The project area doesn't have any area of spiritual significance including religious sites and shrines or burial sites for that matter that could be affected by the road. However issue related to graves that could be affected by the road activities on the proposed sites for the worker camps and other temporary used areas was raised during consultative meetings. The developer

and the contractor will investigate before confirming the sites and all possible will be done to avoid these areas. The contractor is required to adopt and follow the following chance find procedures and this should be part of the ESMP:

If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the Contractor shall:

i) Stop the construction activities in the area of the chance find;
ii) Delineate the discovered site or area;
iii) Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
iv) Notify the Resident Engineer who in turn will notify the responsible local authorities immediately (within 24 hours or less);
v) Responsible local authorities are in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by archaeologists. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
vi) Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
vii) Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities; and
viii) Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the physical cultural resource.

4. Involuntary Resettlement Operational Policy (OP4.12, BP 4.12, GP 4.12)

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by: involuntary taking of land resulting in relocation or loss of shelter; loss of assets or access to assets, or loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. For project activities that impact people and livelihoods in this way, the proposed project will have to comply with the requirements of the disclosed RPF to comply with this policy. The policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

The objective of this policy is to avoid resettlement, where feasible, or minimize exploring all viable alternative project designs. The policy calls for sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share project benefits and to improve their livelihoods. The standards of living should be

restored, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

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

To address the impacts covered under this policy, a resettlement plan or a resettlement policy framework is needed to mitigate against effects of displacement. This framework should cover the development of a resettlement plan or resettlement policy framework that must include measures to ensure that the displaced persons are informed about their options and rights pertaining to resettlement. The displaced persons are consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives and provided prompt and effective compensation at full replacement cost for losses of assets attributable directly to the project.

If the impacts include physical relocation, the resettlement plan or resettlement policy framework includes:

- Measures to ensure that the displaced persons are provided assistance (such as moving allowances) during relocation;
- Provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, locational advantages, and other factors are at least equivalent to the advantages of the old site.

Where necessary to achieve the objectives of the policy, the resettlement plan or resettlement policy framework should also include measures to ensure that displaced persons are offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living and provided with development assistance in addition to compensation measures described in paragraph 6(a) (iii), such as land preparation, credit facilities, training, or job opportunities.

The World Bank Safeguard policy OP 4.12 is triggered by this project because we noted significant economical and physical displacement. It is triggered because the project activity causes land acquisition. Some of the projects sites might involve land acquisition for road width upgrading, borrow areas, etc. Therefore the policy will be triggered by implementation of these activities.

2.5.2 Japanese International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations

The objectives of the guidelines are to encourage Project proponents to have appropriate consideration for environmental and social impacts, as well as to ensure that JICA's support for and examination of environmental and social considerations are conducted accordingly. The guidelines outline JICA's responsibilities and procedures, along with its requirements for project proponents etc., in order to facilitate the achievement of these objectives. In doing so, JICA endeavors to ensure transparency, predictability, and accountability in its support for and

examination of environmental and social considerations.

1. Process of Environmental and Social Considerations

a. Information disclosure

1. In principle, project proponents etc. disclose information about the environmental and social considerations of their projects. JICA assists project proponents etc. by implementing cooperation projects as needed.

2. JICA itself discloses important information about environmental and social considerations at the main stages of cooperation projects, in a manner in accordance with the guidelines.

3. JICA discusses frameworks with project proponents etc. in order to ensure information disclosure, and comes to an agreement in an early stage of cooperation projects.

4. The information to be disclosed includes that of environmental and social considerations and of the cooperation projects themselves.

5. Besides the information to be disclosed publicly by JICA, JICA provides information about environmental and social considerations to third parties to the extent possible in response to requests.

6. JICA encourages project proponents etc. to disclose and present information about environmental and social considerations to local stakeholders.

7. Project proponents etc. disclose information well in advance when they have meetings with local stakeholders in cooperation with JICA. On these occasions, JICA supports project proponents etc. in the preparation of documents in an official or widely used language and in a form understandable by local people.

8. JICA discloses information on its website in Japanese, English, and/or local languages, and provides related reports for public reading at its library and at related overseas offices.

9. JICA pays due consideration to the confidentiality of the commercial and other matters of Project proponents etc., taking into account their competitive relationships, and encourages them to exclude such confidential information from any documents on environmental considerations that they submit which may later be subject to public disclosure. JICA takes into account information control in Project proponents etc. and discloses their documents subject to their approval. Any information that is prohibited from public disclosure in the agreement between JICA and Project proponents etc. may be disclosed only through the agreement of Project proponents etc.. and in accordance with legal requirements.

b. Categorization

1. JICA classifies projects into four categories according to the extent of environmental and social impacts, taking into account an outline of project, scale, site condition, etc.

2. Category A: Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes

projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas.

3. Category B: Proposed projects are classified as Category B if their potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.

4. Category C: Proposed projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society.

5. Category FI: Proposed projects are classified as Category FI if they satisfy all of the following requirements: JICA's funding of projects is provided to a financial intermediary or executing agency; the selection and appraisal of the sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding, so that the sub-projects cannot be specified prior to JICA's approval of funding (or project appraisal); and those sub-projects are expected to have a potential impact on the environment.

6. When necessary, JICA can change a category even after screening. This might occur such as when a new significant impact has come to light as a result of the cooperation project process, or in other specific situations.

7. Projects may not be clearly specified at an early stage of a Master Plan Study. In such cases, the study is categorized based on its likely significant impacts. At that time, derivative, secondary, and cumulative impacts are also considered.

8. JICA requests that Project proponents etc.. fill in the screening form, the information in this form will be a reference for the categorization of proposed projects.

c. Impacts to be assessed

1. The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. Items to be addressed in the specific project are narrowed down to the needed ones through the scoping process.

2. In addition to the direct and immediate impacts of projects, the derivative, secondary, and cumulative impacts as well as impacts associated with indivisible projects will also be assessed with regard to environmental and social considerations, so far as it is rational. The life cycle impact of a project period is also considered. 3. Various kinds of relevant information are needed in order to assess impacts on the environment and local communities. There are, however, uncertainties in predicting such impacts caused by the incomplete understanding of

impact mechanisms and the limited information available. Therefore, if the scale of uncertainty is considered to be large, project proponents etc. provide environmental and social considerations that include preventive measures as much as possible.

d. Consultations with local stakeholders

1. In principle, project proponents etc. consult with local stakeholders through means that induce broad public participation to a reasonable extent, in order to take into consideration the environmental and social factors in a way that is most suitable to local situations, and in order to reach an appropriate consensus. JICA assists project proponents etc. by implementing cooperation projects as needed.

2. In an early stage of cooperation projects, JICA holds discussions with project proponents etc. and the two parties reach a consensus on frameworks for consultation with local stakeholders. 3. In order to have meaningful meetings, JICA encourages project proponents etc. to publicize in advance that they plan to consult with local stakeholders, with particular attention to directly affected people.

4. In the case of Category A projects, JICA encourages project proponents etc. to consult with local stakeholders about their understanding of development needs, the likely adverse impacts on the environment and society, and the analysis of alternatives at an early stage of the project, and assists project proponents as needed.

e. Concern about Social Environment and Human Rights

1. Environmental and social factors are affected by the social and institutional conditions of host countries and by the actual conditions of each project location. Therefore, JICA fully takes these conditions into account when examining environmental and social factors. JICA respects the principles of internationally established human rights standards such as the International Convention on Human Rights, and gives special attention to the human rights of vulnerable social groups including women, indigenous peoples, persons with disabilities, and minorities when implementing cooperation projects

f. Laws, Regulations and Standards of Reference

1. In principle, JICA confirms that projects meet the requirements for environmental and social considerations stated in the Guidelines in the following ways. 2. JICA confirms that projects comply with the laws or standards related to the environment and local communities in the central and local governments of host countries; it also confirms that projects conform to those governments' policies and plans on the environment and local communities.
3. JICA confirms that projects do not deviate significantly from the World Bank's Safeguard Policies, and refers as a benchmark to the standards of international financial organizations

g. Decision-making by JICA

Loan aid, Grant Aid, and Technical Cooperation Projects 1. JICA takes the outcomes of its environmental reviews into account when making decisions regarding the conclusion of agreement documents. If, as a result of its environmental review, JICA decides that appropriate environmental and social considerations are not ensured, it will encourage project proponents.

h. Ensuring Appropriate Implementation of and Compliance with the Guidelines

JICA appropriately implements the principles and procedures mentioned in the guidelines, and ensure compliance with them. JICA responds to objections regarding non-compliance with

the guidelines by establishing an independent body that is separate from project execution departments, in accordance with the Objection Procedures based on the Guidelines for Environmental and Social Considerations.

3. Project Description and Justification

3.1 Description of the project Area

The proposed Ngoma-Nyanza road is 130 km in length and lies entirely within Ngoma and Bugesera districts of Eastern Province and Nyanza district of Southern Province. The road links Eastern Province and Southern Province. Of importance, the road traverses two main rivers; Akagera River, which forms the boundary between Ngoma district and Bugesera District, and Akanyaru River between Bugesera District and Nyanza District. The width of the existing roads is between 6 m and 4 m, in some sections, as densely populated areas and close work of water supply along the route, the width reduces to below 4 meters. Alomost 10 km of the section between Ramiro and Kibugabuga is already asphalted.

Figure 3-1 shows Ngoma-Nyanza road network, which will connect National Road 5 (NR5) in Ngoma District and National Road 1 (NR1), located in Nyanza District.

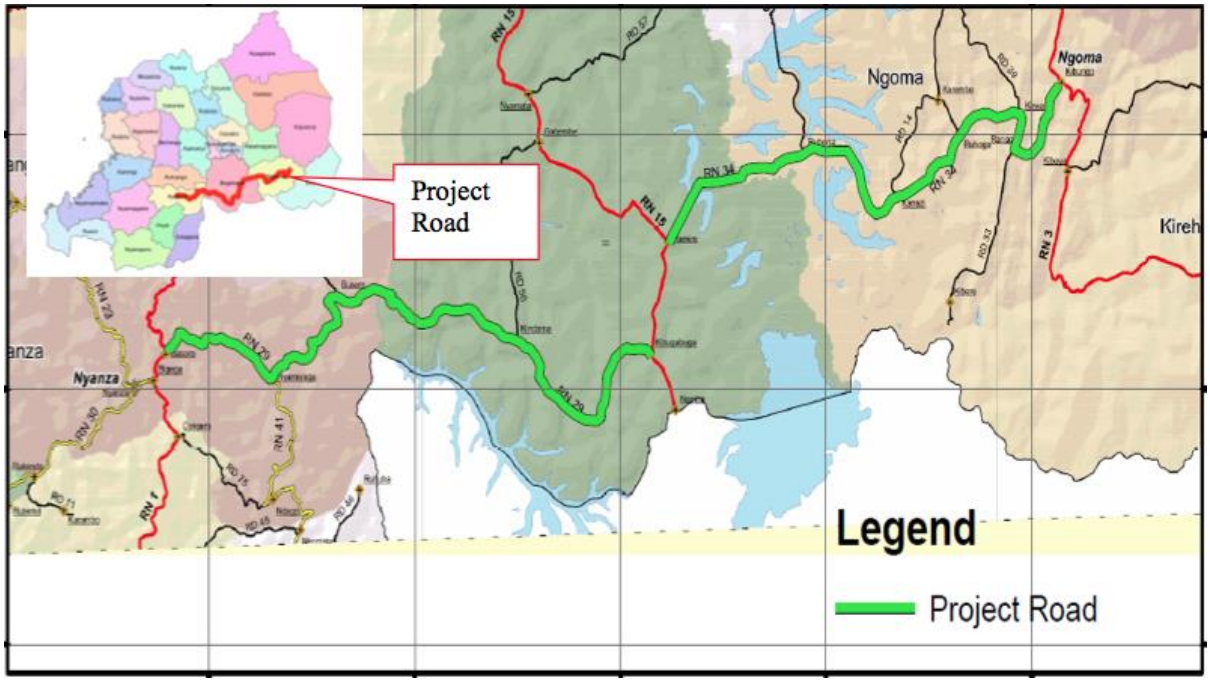

Figure 3-1: National road network and location of the proposed Ngoma-Nyanza road project

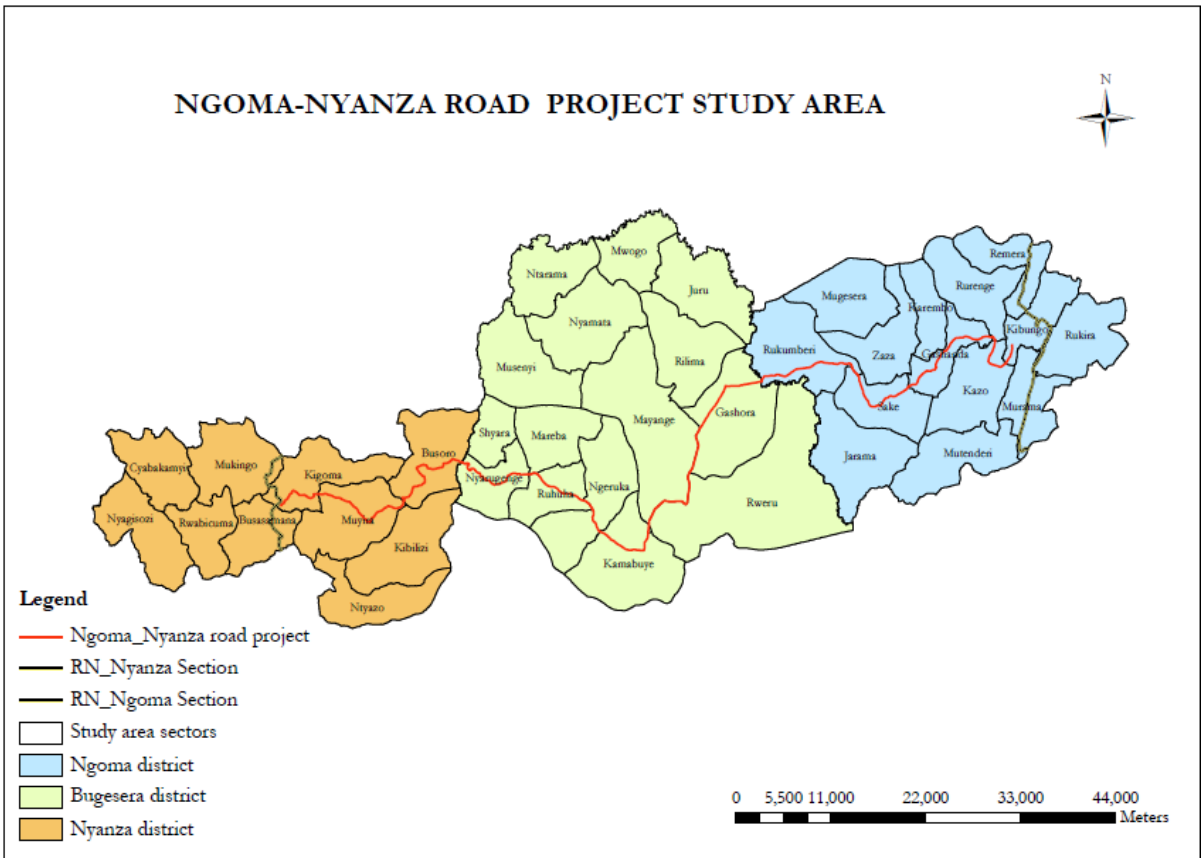

Figure 3-2: Localisation of the proposed Ngoma-Nyanza Road Project in different sectors

This road traverses 15 sectors located in Ngoma, Bugesera and Nyanza Districts as presented in Table 7. The road starts at the junction with the national road Kigali-Ngoma, reaches the roundabout of Runyinya and thereafter runs southward and then westward to Kigali-Nemba road. The vertical and horizontal alignments do not need much correction and carriageway width is not uniform of approximately 4 meters. Hydraulic structures are made up of concrete/masonry, only one water stream is overarched by a wood log small bridge.

Table 3-1: Different sectors traversed by the proposed road and corresponding road section length and Subdivision of the road per lots

LOT	District	Sector	Road section length (Km)
Lot 2	Nyanza	Kigoma	6 Km
		Muyira	12.67Km
		Busoro	5.48Km
		Busoro	6.52Km
	Bugesera	Nyarugenge	10.36Km
		Ruhuha	8.11Km
		Ngeruka	3.39Km
		Kamabuye	8.73Km
		Mayange	5.29Km
Lot 1		Gashora	10.92 km
	Ngoma	Rukumberi	12.01 km
		Sake	9.01 km
		Gashanda	13 km
		Rurenge	0.64 km
		Kazo	4.84 km
		Kibungo	2.38 km

Ilustrative design drawings is provided in Annex 12.

3.2 Project objectives and justification

3.2.1 National perspectives

The Ngoma-Nyanza road upgrading project is a very important undertaking that aims at improving accessibility between Eastern and Southern Provinces. These two destinations are important economic hubs, which are currently connected by an earthen road that cannot support transportation of goods and services and even people. This road was built to stimulate development in the area. The road has been instrumental in facilitating trade, tourism, agriculture, health, education and other sectors of the economy. The expected construction of International Airport in Bugesera District further enhanced the importance of the reconstruction of the Ngoma-Nyanza road, as it will connect Eastern and Southern part of Rwanda to the Airport.

This road will, therefore, play a key role to support economic and social activities in the Eastern and Southern region of Rwanda. The proposed road project will decrease the travel time and driver stress between Ngoma and Nyanza which are commercial cities but also different commercial centres, the High Education institutes (INATEC in Ngoma District and INILAC in Nyanza District) and Administration. It will also facilitate the movement of goods and services. In particular, the road will link different districts and sectors administration, health centres and Trading Centres.

The road will have a reduced roughness index and thus enhancing passengers and driver's comfortability. The road will also reduce the Number of accidents due to the Safety Designs,

realignment, superb road furniture and signage. It will also facilitate the transportation agriculture produce to the markets thus reducing the amount of time and cost of transportation. The road will also encourage investment in terms of buildings and other infrastructure to serve the existing population to serve as dwelling units, shops.

3.2.2 Regional perspectives

On a regional perspective, the project is to be implemented in the context of Lake Victoria Transport Program (LVTP).

The Lake Victoria Transport Program represents the first series of project(s) to be prepared under the Integrated Corridor Development Initiative in the EAC countries, prepared jointly with the EAC Secretariat, and endorsed at the 3rd EAC Heads of State Retreat held in Nairobi, November 29-30, 2014.

The LVTP objective has been identified as to contribute to the efficient and safe movement of goods and people along the regional corridor from the border crossing at Rusumo to the border crossing at Nemba, together with improvements to asset management and road safety in Rwanda. Ngoma-Nyanza road is the first component of project components, which are:

(i) Improving the physical infrastructure; and

(ii) Improving the institutional framework and implementation assistance.

Ngoma-Nyanza road will ease and fast the traffic with Tanzania, Burundi and Rwanda. The road gives opportunity to trade with the three countries from the south to the east without crossing Kigali and Kayonza. The use of Ngoma Nyanza road will have a positive impact on the economy of Rwanda specifically and the region in general as the three other countries can even use the road to access one country from the other.

3.3 Current features of Ngoma - Nyanza road

The horizontal alignment is winding with hairpin curves (radii inferior to 25 meters). In some sections, the vertical alignment is characterized by steep gradients higher than 10%. The road condition is fair but rapidly degrading due to the inadequate hydraulic structures.

While intermittently settlements are present, the project corridor predominantly traverses through rural areas. The ROW along the project road varies from 3m to 7 m with an average ROW of 4 m. However in some rural stretches agricultural lands are also there abutting the project road. The rural sections in plain/rolling terrain along the project road do not pose any major concern except for acquiring additional land to make a total land width of 7 m as ROW, which would call for acquisition of some structures along the corridor.

Drainage Characteristics

The major watershed area, Akagera River, draining towards the proposed road corridor serves as a sub catchment area for Upper Nile basin of the country.

From the site visit investigation it was noted that drainage features of intermittent and perennial streams and Marshlands of wider range characterize the project area. We identified major crossings of the road corridor being Akagera, Akanyaru and Gashora. These are the major streams crossing the road corridor.

From the field work investigation it was possible to identify major crossings of the road corridor Akagera, Akanyaru and Gashora rivers are major rivers/ streams crossing the project road and are provided with Bailey bridge of approximately 65 and 68m lengths and two 7m length Slab bridges respectively, There are also another bailey bridges provided along the road corridor, however, the watershed area of the rivers could not be delineated from the 90m

resolution DEM covers the project area, perhaps the source of streams/rivers is from the swamp area and/or lakes located in/ and around the project area.

Figure 3-3: Fair condition of carriageway but side drains and bridge insufficiently maintained

Figure 3-4: Existing Akagera and Akanyaru bridge to be reconstructed

Figure 3-5: The proposed road traverses Gako military domain with natural vegetation

3.4 Staffing and working conditions

Once upgrading of Ngoma-Nyanza road commences it will involve a lot of civil works including clearing, excavation and levelling of soil, mining of gravel and quarry, transportation of materials, water abstraction, compaction of sub-base material, road sealing, construction of road related infrastructure such as bridges and drainage systems, shouldering, road signage and others.

It is estimated 600 professional, skilled, semiskilled and unskilled employees will be required for the upgrading of Ngoma-Nyanza road.
The proposed 130km road upgrading project will involve both genders where men will participate in key decision making, authorize use of land and where to relocate/reconstruct and undertake heavy manual works. Men would also provide security as watchmen on campsites and machines.

The contractor will use different types of equipment during the implementation of this project including heavy excavators, earth moving equipment, compactors and other lighter equipment. Ngoma-Nyanza road upgrading demands high engineering standards and will therefore necessitate the deployment of qualified civil engineers and other experts include various technicians and a reasonable labour force. In the process of road rehabilitation, the contractor will build several campsites to accommodate staff and facilitate the storage of materials and equipment.

3.5 Duration of construction work activities

The duration of Ngoma – Nyanza road upgradingactivities are estimated at 24 months (see table below) for each section. The phasing of the project from the design to decommissioning is also given in the table below.

The implementation schedule is displayed in table 3-3.

Table 3-2: Project implementation schedule and phasing

Stages		2017	2017	2018	2018	2019	2020	2021	2022	2023	2024
		1st semester	2nd semester	1st semester	2nd semester						
1	Finalization of Financial Agreements										
2	Tendering & contracts awarding										
3	Detailed Design & Initial Mobilisation/activities of Construction Site										
4	Construction works										
5	Guarantee &Maintenance										

6	Decommissioning	25 to 30 years from 2020

3.6 Project interventions

3.6.1 Proposed Design Modifications

Improvement proposal for Ngoma – Nyanza road reconstruction basically consist of two major components, functional and structural.

• **Functional components** address geometric improvement and visible dimensions of the roadway. Improvement proposals apropos functional components manifested in appropriate horizontal and vertical alignments, sight distance availability, lateral and vertical clearances, intersection treatment etc aim improved design speed, road safety and also cover facilities such as proper intersection treatments, truck lay-by, bus bays, way side amenities, etc.

• **Structural components** deal with design aspects for pavement, cross drainage structures, bridges and embankments i.e. the ability of the roadway to adequately carry and support the vehicle/ wheel loads over the design period. Improvement proposals apropos structural components on the other hand calls for detailed evaluation of widening options, concentric or eccentric widening of the existing road as dictated by site situations like available ROW, existing utilities, terrain, etc., and also existing structural conditions, both for pavement and cross drainage structures.

3.7 Proposed activities

The road branches off from the main road NR5 from Ngoma town at Ngoma Prison and runs 130 km in a westerly direction to the terminal point located at Gasoro Centre on National Road NR1 at about 2 m from Nyanza town.

a) Horizontal geometrics

The earth road has reasonable horizontal geometry with long straight sections and curves with large radii. There are some sections with poor geometrics, which can be improved provision of bigger radius to achieve recommended standards.

b) Vertical geometrics

The general descent implies that there are some sections that have unfavorable steep vertical curves especially after Ruhuha City; there are a series of steep descents that may require improvement. The other sections of the roads are located on flat to gently sloping undulating terrain. Ideally, a road constructed in such terrain would be raised by a minimum of 1 m above that surrounding ground.

c) Road cross section

The existing road width ranges from 4m at concrete section on steep grades to 6m on the flat and gently sloping areas. The cross section from road RTDA guidelines gives a minimum width of carriageway of 7 m.

d) Drainage

The existing road is poorly drained and although in most of the sections the alignment is free draining. There are a few drifts locate at seasonal riverbeds.

e) Existing bridges

From the field work investigation it was possible to identify major crossings of the road corridor Akagera, Akanyaru and Gashora rivers are major rivers/ streams crossing the project road and are provided with Bailey bridge of approximately 65 and 68m lengths and two 7m length Slab bridges respectively, There are also another bailey bridges provided along the road corridor, apparently, the source of streams/rivers is from the swamp area and/or lakes located in/ and around the project area.

f) Availability of road construction materials

The road traverses areas of variant physiographic characteristics. At the turn of point, the alignment soils are basically loamy sands, which gradually give way to sands through the whole stretch of the areas. Initial investigations indicate that there are several possible sites that can yield adequate construction materials. There are also different surface water source as the road cross two main rivers (Akanyaru and Akagera) and lakes close to the road alignment.

3.8 Proposed project works

3.8.1 Land clearing and Excavations

Ngoma-Nyanza Road is a flexible pavement, whose construction will involve light and heavy excavations. Heavy excavations will involve excavations up to a firm subgrade, from where the road formation will begin. Light excavation will be undertaken where the road subgrade, sub bases and bases are in fairly good condition.

3.8.2 Drainage Works

Road drainage is the process of interception and removal of water from over, under and vicinity of the road surface. For safe and efficient design of road, road drainage is very important. Stability of road pavements can be maintained if surface and foundation bed remain in good condition. Drainage works on the proposed road form a major component of the strengthening works, since most of the existing hydraulic structures are absent, damaged or inadequate.

The drainage structures are missing and where available, they are inadequate, to convey the water on the road alignment and adjoining areas. The soils along the road alignment have poor permeability and hence pools of water collect on the side of the road, undermining the stability of the road.

In this respect, the design to strengthen the road will involve several drainage structures for intercepting, removing and controlling surface and subsurface water, from entering the road structure, as highlighted in the following sections.

3.8.3 Surface Drainage

This is the removal and diversion of surface water from the road and adjoining land. The system allows surface water to flow from the road surface without percolating into the shoulders. The water is collected in side drains and disposed off at the nearest stream or valley.

Drainage structures for this purpose will include, side drains, mitre drains, longitudinal drains. The side drains; mitre drains and longitudinal drains will have sufficient slopes to allow free flow of water into the nearest streams and valleys. The road camber and shoulders equally shall

have sufficient slope t convey the water from the road surface into the side and longitudinal drains.

3.8.4 Sub-Surface Drainage

This is a system of diversion or removal of excess soil water to the ground water. The main function of subsurface drainage structures is to keep the variation of moisture in subgrade soil to a minimum. This is achieved by lowering the water table; controlling seepage and controlling water rise through capillarity.

Subsurface structures for this purpose will include longitudinal drains and transverse drains or cross drains. Where the longitudinal drains are deemed inadequate on their own, transverse drains situated at appropriate intervals will be provided.

3.8.5 Cross Drainage Works

Cross drainage works main function is to discharge water, collected in side drains or natural streams, across the road from one side to the other as quickly as possible. Adequate functioning of the road depends to a large extent on the effectiveness of the cross drainage work. Quick drainage prevents water from penetrating into the soil sub grade and thus prevents failure.

The cross drainage structures that will be incorporated in the design include culverts and perforated drifts. The cross drainage structures, mainly culverts and drifts, will abound along the entire stretch of the proposed road. This is necessitated by the numerous dry riverbeds cutting through the proposed road.

Drifts will either be submerged culvert drift or concrete slab drifts. Both types are ideal solution to the several dry rivers crossings problem on the proposed road that is located on a low development area, low traffic and flash floods abound.

3.8.6 Bridges

Routing the design flow along the stream channel, results in defined water surface profile that will help to size bridge span and clear height. Afflux (backwater effect) were evaluated under different constriction trails (optimization) to arrive at economical and safe hydraulic bridge opening size as shown below.

Geometric conditions

The type of bridge selected depends on the vertical and horizontal alignment of the highway route on the clearances above & below the roadway. Continuous box girders and slabs are good choice for abridge on a curve site, since they have relatively high torsion resistance. Relatively bridges with larger spans navigable waterways will require different bridge type than medium spans crossing a flood plain.

The site geometry will dictate traffic can be handled during construction which is safety issue considered in selection on bridge type.

The bridge spans, type of superstructures adopted for the bridges are described in the table below:

Table 3-3: Type of superstructures adopted for the bridges

Station (km)	Bridge description				
	Bridge span (m)	Name of River	Superstructure type	Sub-structure type	Remark
42+952	3×22	Akagera	RCDG	Concrete, abutment, Wing wall, RC Pier	New bridge
45+360	2×14	Gashora	RCDG	Concrete, abutment, Wing wall, RC Pier	New bridge
98+603	3×22	Akanyaru	RCDG	Concrete, abutment, Wing wall, RC Pier	New bridge
99+378	1×18	Rwabusoro	RCDG	Concrete, abutment, Wing wall	New bridge
10+472	1×15	**Cyamugani**	RCDG	Concrete, abutment, Wing wall,	New bridge

The following loads were considered in the design of substructures:

- Dead loads
- Live loads
- Wind loads on structure
- Wind load on live loads
- Longitudinal forces
- Stream Forces

The load combinations described in the previous section have been applied in the design of the substructures. The stability of the substructures was checked against Overturning, Bearing Pressure and Sliding.

3.9 Project output

The main output of the work is a standard engineered asphalted road with an asphalted running surface, road cross drain comprising of culverts and perforated drifts. Widening of existing horizontal curves and improvement of vertical curves will also improve the geometrics of the existing road.

For the upgrading of the road, the project will acquire an estimated area estimated to 872,726sqm. The area includes public domain and private land. PAPs to be economically and physically displaced will be fairly compensated for relocation to areas of their choice.

Table 3-4: Total area of land to be lost with the upgrading of the road

Lot	District	Sector	Road section length (Km)	Total Area to be lost in m^2
Lot 1	Ngoma	Kibungo	2.38	16,899.26
		Kazo	4.84	34,366.56
		Rurenge	0.64	4,544.34
		Gashanda	13	92,306.87
		Sake	9.01	67,526.03
		Rukumberi	12.01	88,827.62
	Bugesera	Gashora	10.92	93,016.93
TOTAL Lot 1			52.8	397487.61
Lot 2	Bugesera	Nyarugenge	10.36	73,561.48
		Ruhuha	8.11	57,585.29
		Ngeruka	3.39	24,070.79
		Kamabuye	8.73	61,987.62
		Mayange	5.29	37,561.80
	Nyanza	Busoro	12	87,904.55
		Muyira	12.67	89,963.70
		Kigoma	6	42,603.17
TOTAL Lot 2			66.55	475,238.40
	Total			**872,726**

3.10 Raw material supply

The road works will involve considerable construction materials usage. The quality and availability of materials for road construction is critical in road construction works, and hence the selection of materials sourcing areas and the need for material testing and investigations. In addition, the road profile formation requires to be investigated for its strength to carry the anticipated vehicular loading and permeability. Ideally, material sources should be located along the existing road alignment.

Laterite Soils

The existing road subgrade is mainly composed of laterite and sandy soils. The subgrade soil's main function is;

- Provides stability and durability to the road pavement under adverse climatic and loading conditions.
- Support the road pavement
- Provide proper drainage to rain and underground water.

Road defects such as waves, corrugation, rutting is caused by poor subgrade soil conditions. Hence the soils that are used for subgrade should be compacted and stabilised to provide the stability and durability to the road. Different sites along or close to the road alignment have been identified as sources for subgrade soils. For each of the new sites selected for the project, the contractor will develop an ESMP and submit it for approval of the Project team and the WB (see Tables 3-5 and 3-6).

Aggregates

Aggregates are a major component used in road construction. In the proposed project, aggregates will be used in, granular base and sub base, concrete works for drainage structures

such as culverts, river crossing drifts. Aggregates bear the stresses occurring on the roads and have to resist wear due to abrasive action of traffic.

The tests need to be undertaken to decide on the suitability of the road aggregates for the road construction, which include impact tests, los angles abrasion test, crushing strength test, water absorption test and soundness test. The materials investigation study for the road construction works has been carried out and some sites been identified along the road, with all the borrow pit/quarries logged showing the materials consist of either lateritic, quartzitic gravel or a mixture of the two.

Project Material sites

1.Borrow pits

The engineer proposed 18 borrow sources for embankment fill, 9 rock quarry sources, 6 sand sources and 4 water sources, all located in the surroundings of the project site with an offset varying between 0km and 22km.

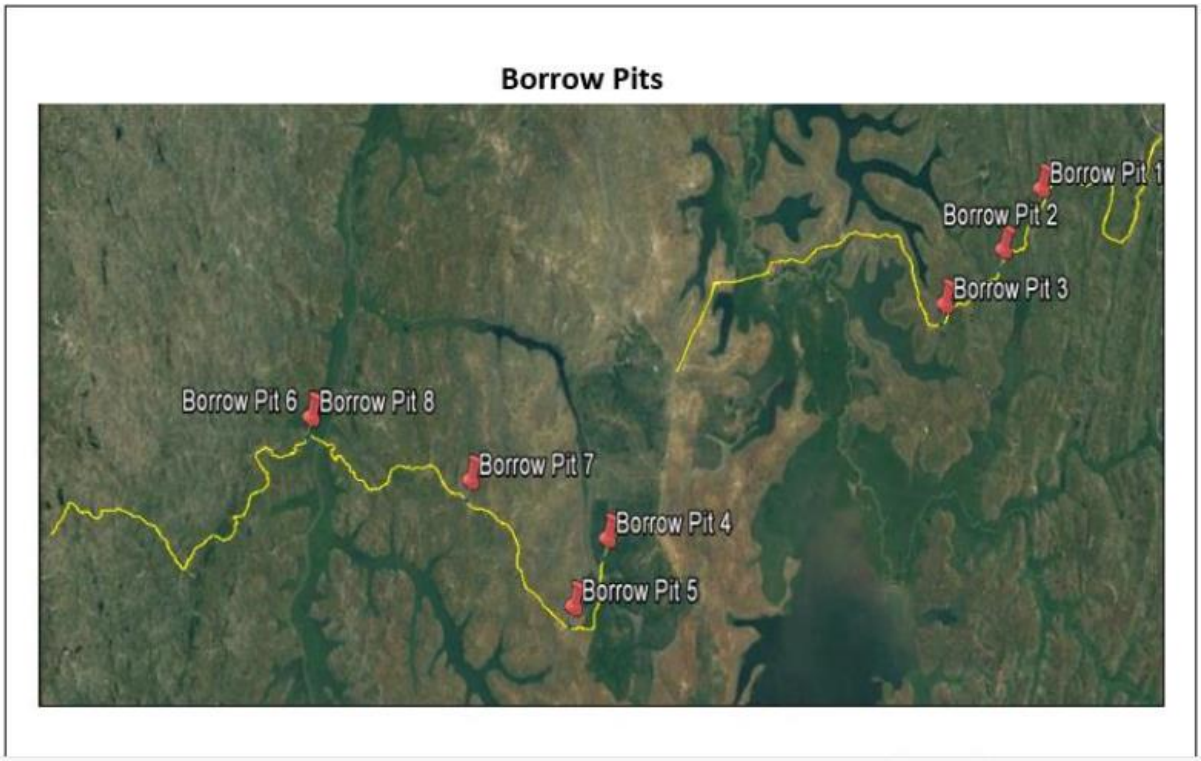

Figure 3-6: Mapping of selected borrow pits

The consultant has checked a number of 18 borrow material sources proposed by the engineer.

It was not possible to find some for which the geographic coordinates or exact locations (district, sector, cell and village) were not provided.

Among them the following:

Plate 3-1: 14km from Ngoma (Natural gravel)

Plate 3-2: 18km from Ngoma (Natural gravel)

2. Quarry sites

The project will use the existing licensed quarries in the vicinity of the project area.

Plate 3-3: Rwinkuba rock quarry, 12.8km from the start of project Ngoma (Granitic quartzite)

Plate 3-4: Munege rock quarry, Km 20+100, RHS, Offset 300m (Whitish grey quartzite and granitic)

Plate 3-5: Akanyaru rock quarry, Km 100+600, RHS (granitic quartzite)

3. Sand pits

Plate 3-6: Burakari, 102.670 km from 0+000/Ngoma

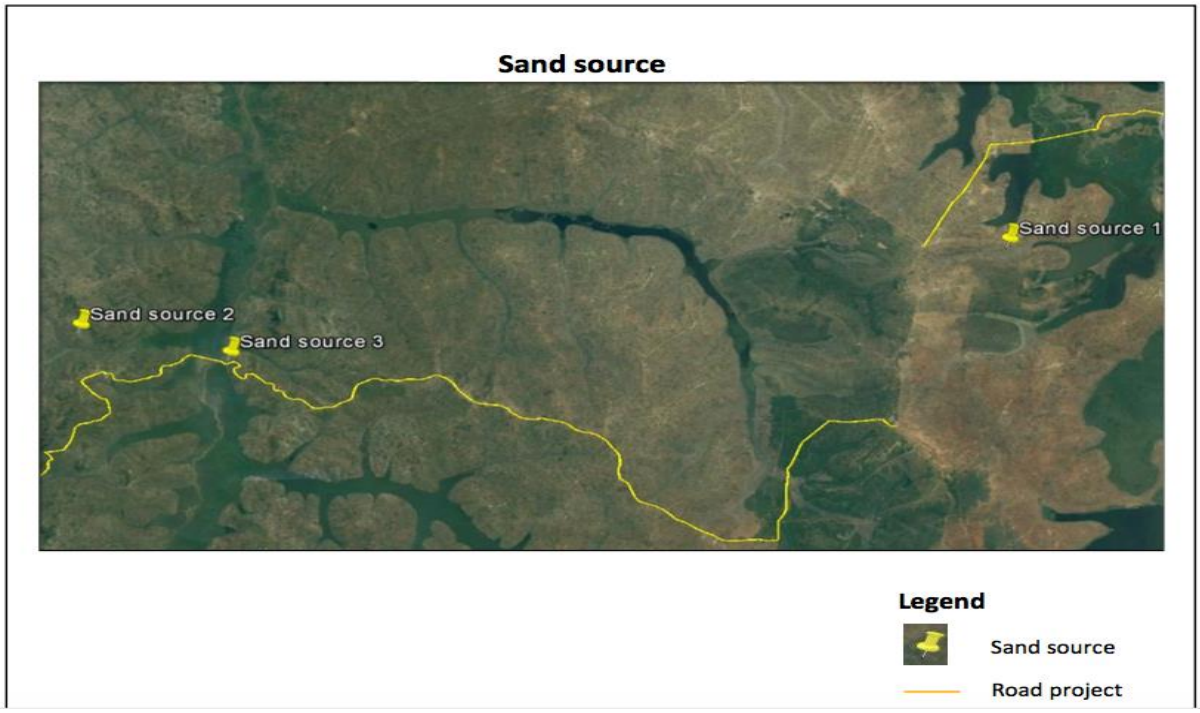

Figure 3-7: Mapping of proposed sand sources

4. Water resources

Plate 3-7: Akagera River, Km 46+400/ the road crosses this river through bail bridge

Plate 3-8: Rusengo stream, km 112+140/ the road crosses the River at the station

Plate 3-9: Burakara stream, Km 102+670 offset 2km

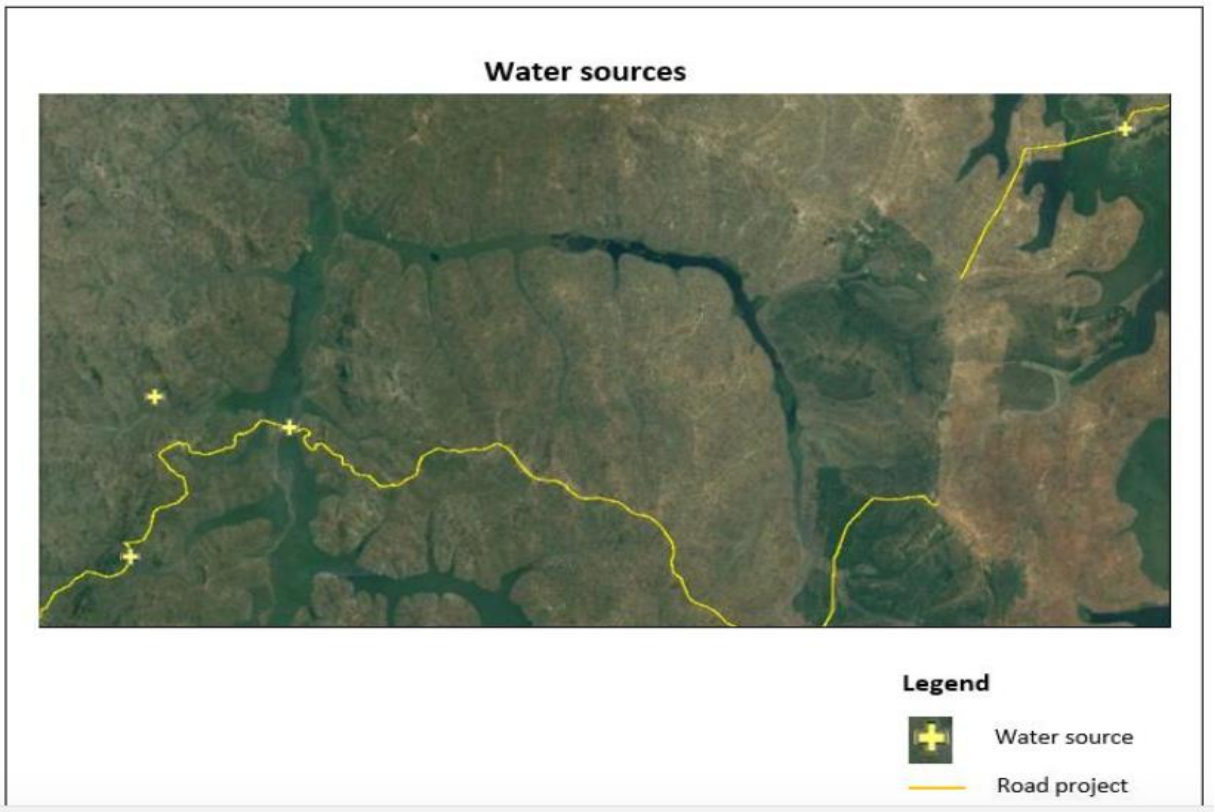

Figure 3-8: Mapping of proposed water sources

Table 3-5: List of borrow sources from embankment fill assessed

Borrow sources from embankment fill			
Number	**Station**	**Material description**	**Status**
1.	18+000, RHS	Reddish brown Sandy Clay with Gravel inclusion	EIA required
2.	24+000, RHS OFFSET 30M	Reddish brown, wet, Medium plastic Silty Clay	EIA required
3.	29+000 RHS OFFSET 50M	Reddish brown Sandy Clay with Gravel inclusion	EIA required
4.	70+300 RHS OFFSET 50 M	Grayish brown, Laterite, Sandy Clay	Not selected. Coordinates showed the site falls in Gako military domain
5.	76+400 LHS	Reddish brown Sandy Clay, Lateritic	EIA required
6.	102+000 RHS OFFSET 70M	Grayish brown Sandy Silt	EIA required
7.	88+000 RHS	Reddish brown Gravelly Sand with some Silt	Not selected. The material is not

			suitable and the site is closed to residentail areas
8.	100+000 RHS	Reddish brown, Silty CLAY with Sand inclusions	EIA required

Table 3-6: List of quarries assessed

Quarries			
Number	**Station**	**Rock quarries Material type and field description**	**Status**
1.	12+800 RHS OFFSET 2 KM	Rwinkuba Quarry Whitish Granitic Quartzite	EIA required
2.	20+100 RHS OFFSET 300M	Munege Rock Quarry Quartzite and Granite	EIA required
3.	25+200 RHS OFFSET 200M	Nkaga Rock Quarry Dark grayish to dark pinkish Granitic Gneiss, and Whitish Quartzite	EIA required
4.	100+400 RHS	Rwabusoro Rock Quarry Quartzite and Granite	EIA required
5.	100+600 RHS	Akanyaru rock Quarry Granitic Quartzite	EIA required

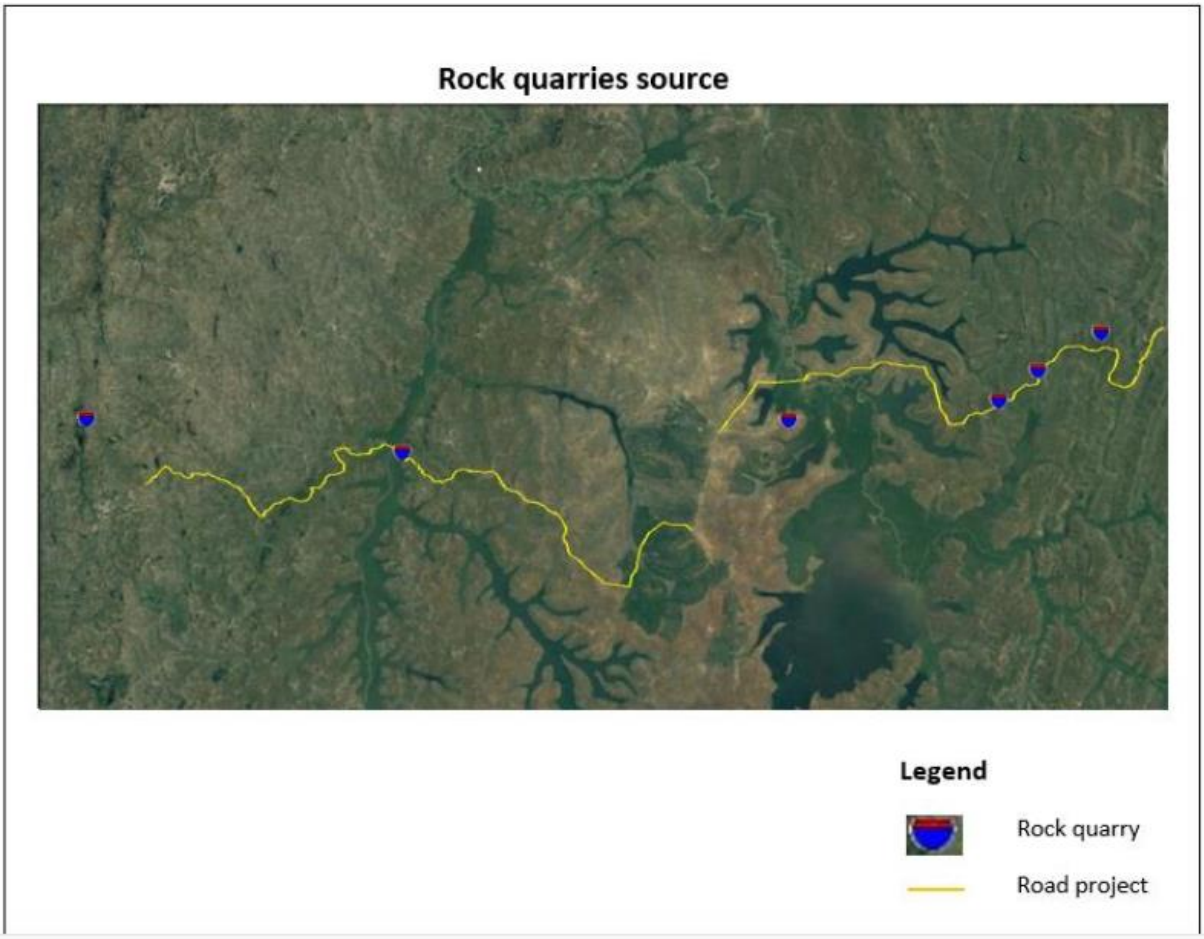

Figure 3-9: Mapping of rock quarries assessed

4. Description of Project Environment

4.1 Physical environment

4.1.1 Topography and Geology

Topography of the study area is characterized by its existence of marshlands where are located along rivers and in land. Ngoma-Nyanza road project area is located in the lowlands of the East. The project area is found in the southeastern plains of Rwanda's Eastern Province and a part of Western Province. The region is sandwiched between Rivers Nyabarongo and Akanyaru, which converge at the southern end to form the Akagera River.

Table 4-1: Summary of Topography and Geology in the project area

District	*Topography/Vegetation*	*Geology*
Ngoma	Undulating steep to gentle sloping hills with scattered shrubs and thicker vegetation on the hilltops and scattered shrubs on the slopes and lands.	Pre-Cambrian granitic rocks, fractured in some valleys. Quartzite horizons overlying in a few places.
Bugesera	Undulating steep to gentle sloping hills with scattered shrubs and thicker vegetation on the hilltops and scattered shrubs on the slopes and lands.	Pre-Cambrian granitic rocks, fractured in some valleys. Quartzite horizons overlying in a few places. Granitic intrusions, in Central and Eastern parts. Meta-sedimentation and quartzite horizons in the northwestern and southeastern parts of the District with regional fractures.
Nyanza	Steep to gentle sloping undulating hills with thicker vegetation on the hill tops and scattered shrubs on the slopes and lands.	Granitic intrusions, in Central and Eastern parts. Meta-sedimentation and quartzite horizons in the northern and western parts of the District with regional fractures. Rwabusoro marshlands are known to have peat soil reserves considered a source of energy.

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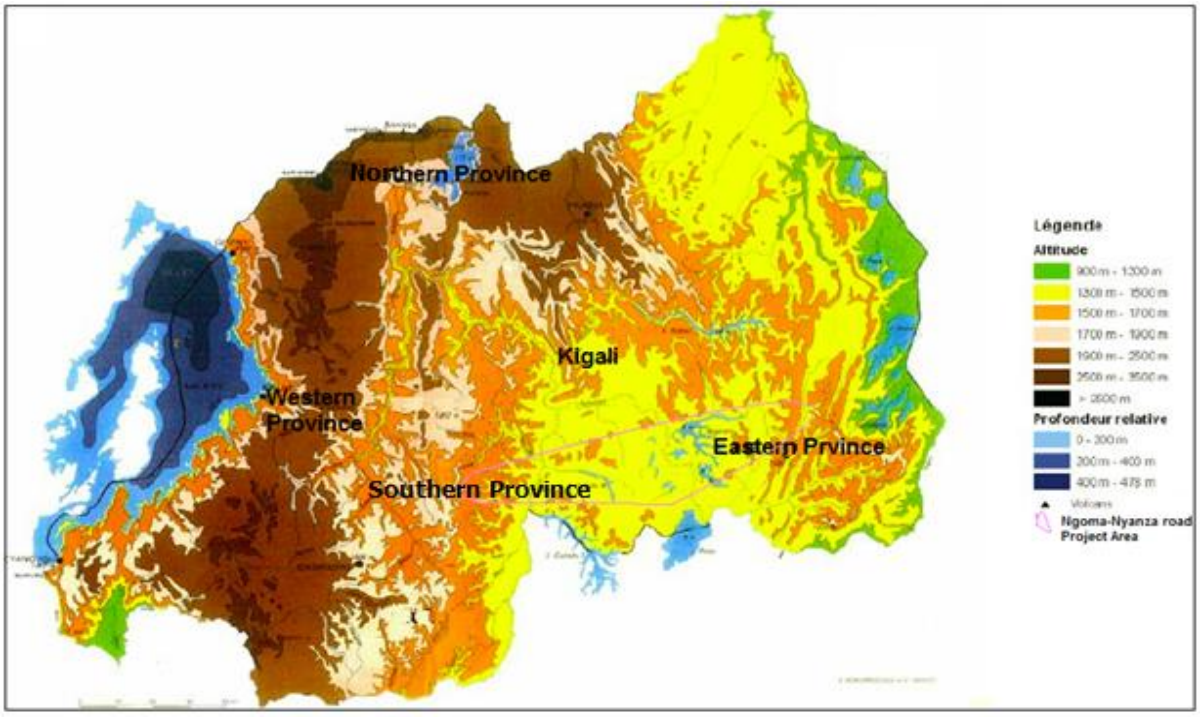

Figure 4-1: Rwanda topographic features showing the proposed Ngoma-Nyanza road project area

4.1.2 Soil

From our observations, we were able to characterize the soil of the project area as follows:

Ngoma

Ngoma soil is favorable for agricultural activities due to the presence of little sandy –clay soil mixture

Bugesera

The soils of the project area and the district are generally sandy with a low quantity of humus and are very permeable. The shores of the lakes and marshes give, in some areas, clay which is used in making bricks, tiles and traditional pottery. There are also many kinds of sand used for construction of houses. The soils in the valleys are characterized by their richness in nutritious minerals but often with low content of organic elements and materials. They are hard during the dry season and muddy in the rainy season.

Nyanza

Not far from the site, appears mica schist for which alteration products are sufficiently siliceous. Their aspect suggests they can be successfully used for construction activities. Soils change according to their location on the hill, the best soils are in swamps (they are quite sandy and humus) if they are not stuck in the sand by erosion of the hills. The soils on granite ridge are less fertile; they are very poor in humus. The soils of the central plateau are less bad; they are of koalisol, fertile when they have not been degraded by erosion and when the topsoil of these soils is well preserved.

Rwanda has estimated reserves of 155 million tons of dry peat spread over an area of about 50,000 hectares. About 77% of peat reserves are near Akanyaru and Nyabarongo rivers and the Rwabusoro plains[1].

4.1.3 Temperatures and rainfall

Rwanda is located between two key climate regions (East Africa and Central Africa). Even though Rwanda is located in the tropical belt, it experiences a temperate climate as a result of high elevation.

Ngoma District

The climate is temperate especially in low altitudes. The annual average temperature is around 20oC. Ngoma like other regions of the country enjoys four seasons of which two are rainy and other two are dry: a short rainy season. The resulting pluviometry deficit impacts adversely agricultural and pastoral production. The volume of annual precipitations on the whole of the district lies between 900 and 1400 mm of rains.

Bugesera District

Bugesera District differs from the rest of the country by a poor distribution of rainfall. Its climate up this region among the less rainfall and warmer of Rwanda (average rainfall 810 mm/year, which severely limits the agricultural potential of the region. The project area has moderate climate with annual average minimum and maximum temperature of 14 0C and 29 0C respectively.

Nyanza District

The Nyanza District is located in the humid tropical region. This region is characterized with changing of seasons, the wet season alternating with the dry season. The western, mountainous, recorded relatively cool temperatures and abundant rainfall, compared to the eastern low-lying with annual average temperature are around 20 ° C. Rainfall values through the year vary between 1400- 2100mm.

4.1.4 Water quality

Water hyacinth control activities have been done in Lakes Cyohoha, Rweru, Ihema and other small lakes but the scale of activities is too small and too localized to create meaningful impact.
But water quality analysis of Akagera and Akanyaru wetands has raised some concerns.
Below are the results water quality monitoring conducted in rainy season in order to get the maximum values of different parameters of Akagera and Akanyaru rivers and assess the pollution.
The pH values meet the standard for surface water (6.5 - 8.5) for many sites. The turbidity is higher than the standard in the Congo basin. The rivers have higher turbidity values. There is a pollution problem of surface water caused by high turbidity. Therefore, appropriate measures need to be taken in order to increase infiltration of rainwater on hillside and avoid surface run-off as prevention against erosion furthermore, riverbanks needs also to be protected.
Total suspended solids are high and are the result of sediments carried by the water; the source of these sediments includes natural and anthropogenic (human) activities in the watershed, such as natural or excessive soil erosion from agriculture, forestry or construction. The COD was high when compared to the standard for surface water. These high values of COD are an

[1] **https://energypedia.info/wiki/Rwanda_Energy_Situation**

indication of the water pollution mainly due to the surrounding human activity occurring near the sites. This may be due to the dumping of wastewater coming from household, industrial or agricultural activity in the surrounding area.

Table 4-2: Water quality monitoring (Akagera and Akanyaru rivers)[2]

Parameters	Unit	Bugesera	Bugesera	Bugesera
		Nyabarongo before entering Akagera river	Akanyaru before entering Akagera river	Akagera after receiving Nyabarongo and Akanyaru
Temperature	°C	22	22.24	22.44
pH	-	7.36	6.58	6.85
Turbidity	NTU	654	77.3	634
Conductivity	µS/cm	142	123	265
Total Suspended Solids	mg/l	407	30	358
Total Nitrogen	mg/l	nd	nd	nd
Total Phosphorus	mg/l	0.16	0.13	0.12
COD	mg/l	246	32.2	87.5
BOD	mg/l	nd	nd	nd
Dissolved Oxygen	mg/l	na	na	na
Copper	mg/l	0.00	0.05	0.04
Zinc	mg/l	0.20	0.11	0.05
Iron	mg/l	1.68	2.83	2.27
Manganese	mg/l	0.131	0.123	0.15
Total Hardness	mg/l $CaCO_3$	74	60	56
Faecal Coliforms	Cfu/100ml	8×10^6	6×10^2	8×10^2
E.Coli	Cfu/100ml	8×10^6	5×10^2	5×10^2

4.1.5 Air quality

Data on air quality in the catchment and project areas are not available. While noting the particulate matter levels may be below the occupational health standards (10mg/m3), there may be notable levels along the earth roads giving access to different areas within the centres and economic activity areas. There are lower levels in rural sections of the corridor with low population and human activities.

A significant of the particulate matter is associated with traffic on poor road surfaces. The trends in other follows the same pattern as the particulate matter, i.e. low along high-speed sections (25 – 50mg/l) and notable along sections with slow moving vehicles.

[2] **RNRA, 2011**

Sulphur Dioxide (SO_2) Monoxide (CO), Volatile Organic Carbons (VOC) and Nitrogen Oxides (NO_x) are not known but expect they are all below detection levels. An intensive monitoring may be required to establish long-term trends.

4.1.6 Noise and Vibrations

Noise levels in different points of the three districts were measured with a sound meter. The levels vary depending on whether there is a source of noise or not and what type of source is emitting the noise. The noise measured during the day varies between 51dB and 69dB. This should be considered as the noise background level.

4.1.7 Waste

Solid waste management is an issue in both urban and rural areas of Ngoma, Bugesera and Nyanza districts. Though there is a system of collection and transportation of solid wastes across the country, solid waste management in those areas faces many challenges including lack of waste sorting/separation at source, poor wastes disposal and management of dumping sites, poor treatment and exploitation of the generated solid waste, among others.

Data on waste generation, source of waste and quantities disposed in existing sites within the road corridor of influence are not available. In the rural areas, the district development plans are emphasizing that each household (100 per cent) should have a well-managed dumpsite by 2018; these are the same targets in the EDPRS. For urban areas other than Kigali such as Bugesera, Ngoma and Nyanza centres, information was not available regarding how solid waste is disposed and how much is disposed. However key district informants mentioned burning and localized dumping areas.

Unplanned resettlement in the first years after the end of the 1994 conflict was accompanied by initial poor site selection and planning of imidugudu settlements in eastern province, mainly due to the breakdown of governance institutions. This has led to a number of environmental problems with important implications on water shortages and poor sanitation. To address these problems, the government is developing planned urban and peri-urban settlements for low-income households in order to facilitate the delivery of basic services.

4.1.8 Land use

We note a common land use in the three districts areas crossed by the road.

Land use in the project sites and the surroundings is primarily under cultivation of food crops and settlement. The local communities cultivate a variety of food crops under mixed cropping. They include bananas, pineapple, cassava, passion fruits, avocado, coffee, and tea among others. The trees are dominated by eucalyptus.

Cultivation occurs along the steep slopes predominant in the area without proper soil conservation techniques hence accelerating soil erosion. However, it is worth mentioning that terracing as a measure for soil erosion control is practiced in some parts surrounding the project areas. A few of the local communities also keep livestock mainly cows under the Girinka programme.

The main crops found growing in the proposed area for irrigation include mainly sugarcane and rice and to limited extent banana and maize in marshland.

There are low standing houses around the project sites and different infrastructures mainly feeder roads, narrow earth roads, bridges and culverts, for which a few will be impacted by the implementation of the project.

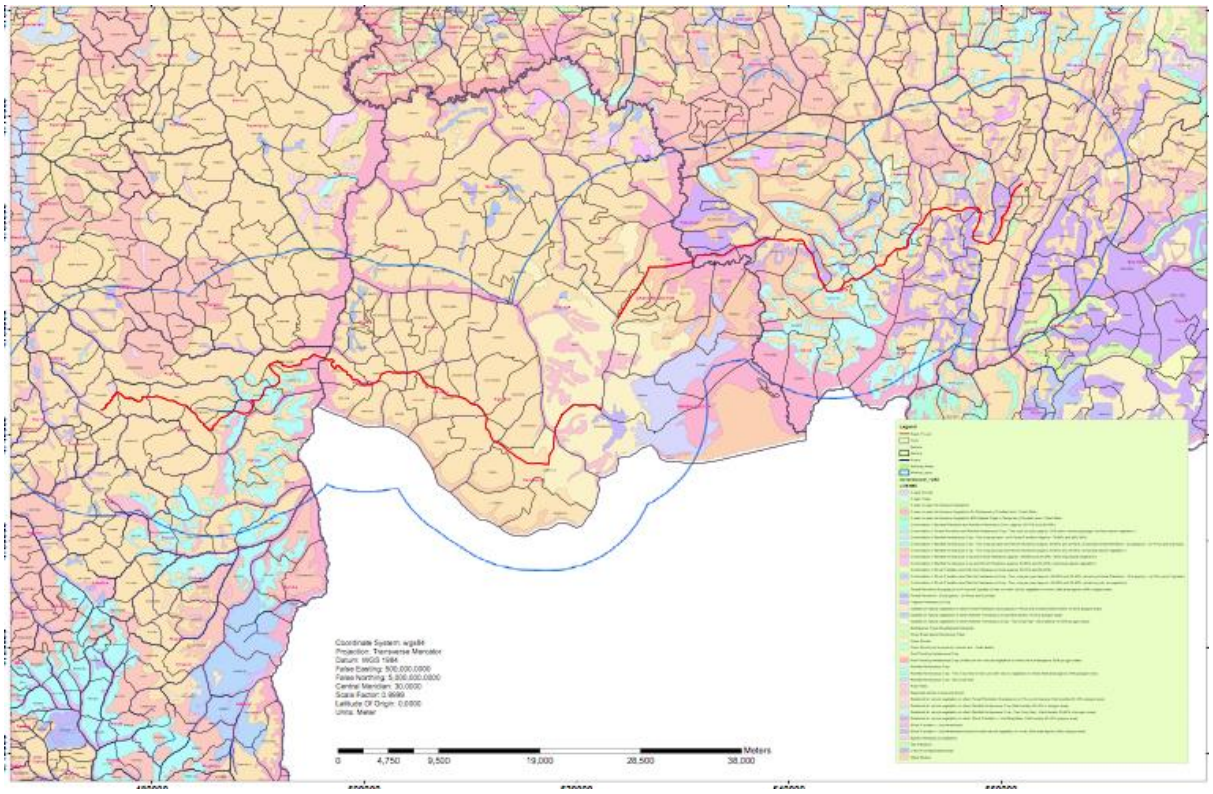

Figure 4-2: Land use within the area of influence (10km)

4.1.9 Hydrology and drainage

Ngoma

The western part of the district is made up of vast wetlands constituted by depressions of fluvio-lakes of the Akagera that offers a typical landscape of lakes and swamps

Bugesera

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

Nyanza

The hydrographic network includes the most important rivers of the country, namely Akanyaru Mwogo Rivers. Several other relatively less important water resources are tributaries of those rivers. Apart from the perennial rivers, Nyanza District also has many streams of intermittent flow especially in its eastern part.

Hydrology of the project area

The hydrological system of Ngoma – Nyanza road project area belongs to the Nile Basin and the Akagera sub-basin. The whole of the area is characterized by the marshy and Lake Complex of Akanyaru, upstream, the marshy and lake system of Nyabarongo-Akagera, downstream. The

principal marshy extents of Bugesera are, on the one hand the Lower Akanyaru Complex and its Nyavyamo tributaries downstream from Lake Rwihinda and Cyohoha Lake, and on the other hand, the Rweru-Kanzigiri Complex and Akagera right in its downstream.

Akanyaru River curves, by a very slow course, in a marsh of *Cyperus papyrus* where it traces several meanders. The tributaries of the river are all marshy. It is in these secondary valleys that the marshes are located, hosting the various lakes. Waters of these lakes are maintained in place only thanks to the existence of these marshes.

The hydrological study which was done by Ntakimazi (1985) on these systems highlighted the annual and inter-annual fluctuations of the level of water in Akanyaru and Nyabarongo rivers, entailing that of the lakes. During the rainy period of April - May, one observes risings of Akanyaru and Nyabarongo rivers. Under these conditions, the surplus overflows over banks and floods the marshy valley and the lakes. Similarly, at the junction of Akanyaru-Nyabarongo, the flow of the principal river slows down and can even block that of the tributary, thus supporting the overflow of water in the lower part of the latter, in the side valleys and in the lakes. These marshy systems are used for storage of important quantities of water during the rainy season, which runs out then more slowly in the rivers during the dry season and at the beginning of the following rainy season, thus making water longer available to the natural and agricultural ecosystems. The hydrological surplus or deficit influences the flow of the following year. The annual fluctuations from 1-1.5 m (extreme of 3.5 m) for the level of the lakes constitute an important modification depth and extent of the lakes, and thus indirectly influence most of the ecological parameters in the lake.

At Rweru Lake, the low-level mark is lower than the shallow water, which delimits its discharge system; even if the level in Nyabarongo is lower than that of the lake, there is no straight flow between the two milieus. The lake runs towards Akagera as of the rise of water of the beginning of the rainy season. In March-April, the level of the river goes up more quickly and exceeds that of the lake; the flow is then reversed and it is the river, which runs towards the lake, invading then the entire surrounding marshy zone. With the fall, from June to August, the lake runs again towards Akagera, initially over the marsh, by a single channel then. Akagera water is abstracted to pump water and irrigation Gashora marshlands. The hydrology of this specific project confirmed there won't be impact in the catchments and the needs of the population downstream won't be compromised.

Cyohoha Lake, on the contrary, is separated from Akanyaru River by an 11-m depth vegetable stopper in a valley of 24km-long and 500m-width. The hydrological communication between the lake and the river is done by slow diffusion of water, in a direction and in another, through the marsh. Almost non-existent during low waters, it becomes significant at the time of the risings of the river where it contributes, with the secondary precipitations and tributaries, to rise the level of the lake by approximately one meter. Apart from exceptional risings, the average annual fluctuations of the level of Akanyaru do not make it possible to flood the marsh to the lake. It is thus very seldom that the lake and fluviatile system have a frank communication by a continuous water table. 10

Contrary to Rweru Lake, Cyohoha Lake is maintained only thanks to the contributions of its own tributaries and precipitations, the marsh downstream being especially a dam, which fixes the level. A succession of 2 - 3 years of hydrous deficit has as a consequence a very significant fall of the level of water in the lake.

Thus, the drainage of the marsh downstream would be fatal for the system. It would be a matter of opening an exit point for all water, like one empties a pond of stopping. This is what occurred for the Northern Cyohoha Lake in Rwanda in the 1980's and 2000's.

The marshy Akanyaru and Nyabarongo-Akagera Complexes thus have a regulating function, not only on the level of the rivers, but also on the level of the lakes. The shoals, consisted of vegetable stocks, make it possible for the lakes to be maintained on a level higher than that of the rivers, and thus to remain during the periods of low-level water.

4.1.10 Surface Water Resources

The project area's hydrological network includes numerous lakes and rivers and its associated wetlands.

Water resources in the study area are divided broadly into three (3) categories, namely, river, lakes (and marshes), and groundwater. There are few springs of water in the area and some intermittent courses risen from streams, but they are evaporated during the dry season.

1) Rivers

The existing earth Ngoma-Nyanza road is to be upgraded to asphalted road across Akagera River and Akanyaru River. Akagera River results from the junction of the rivers of Nyabarongo and Akanyaru. Akagera River runs a part of the circumference of Bugesera towards the southern part of Rwanda and serves as the border between Bugesera District and Ngoma District in the East and the border between Rwanda and Burundi in the Southern Part, deposits fertile soil to marshlands in flood season and supplies in the same time the multitude of lakes of the southern basin.

The course of Akagera River runs with a weak slope, where the existence of many meanders marking along its majestic course. The river takes many directions, goes and comes back and finally rushes into the great cataracts of Rusumo, from there takes the direction of North making the border of Rwanda with the Republic of Tanzania. The average width is approximately of 4 meters whereas the depth is also of 4 metres during the dry season.

2) Lakes

The project area has many lakes among which nine (9) are located in the Valley of Akagera, Rweru Lake and North and South Cyohoha Lake. The floods of Akagera and the lake of Rweru have formed the lakes of Gashanga, Kidogo, Rumira, Mirayi, Kirimbi and Gaharwa. There are also Birira, Sake and Mugesera Lakes located in Ngoma District.

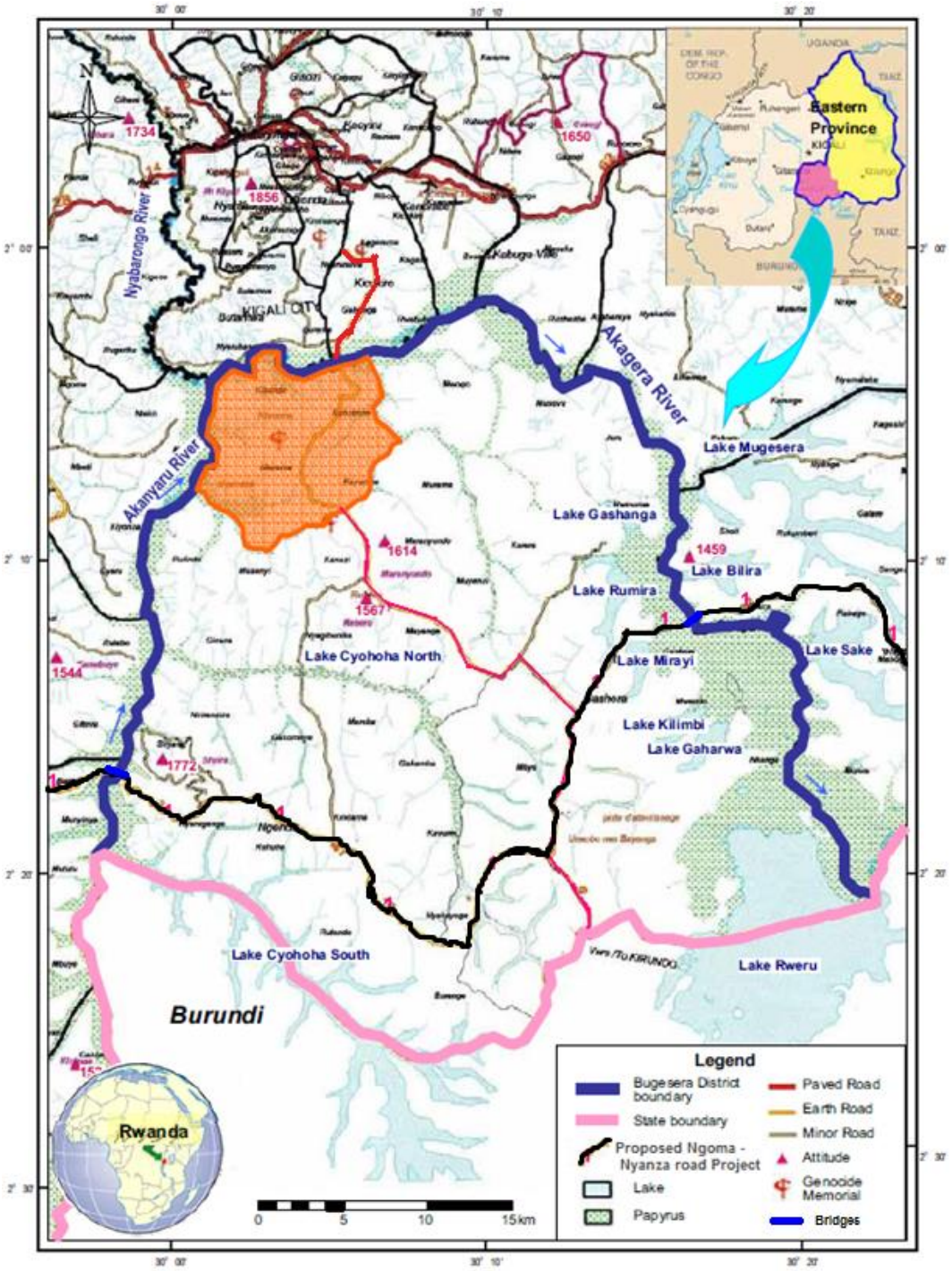

Figure 4-3: Ngoma-Nyanza road project and location of lakes

Figure 4-4: Proposed Ngoma-Nyanza Road Project and different lakes in the project area

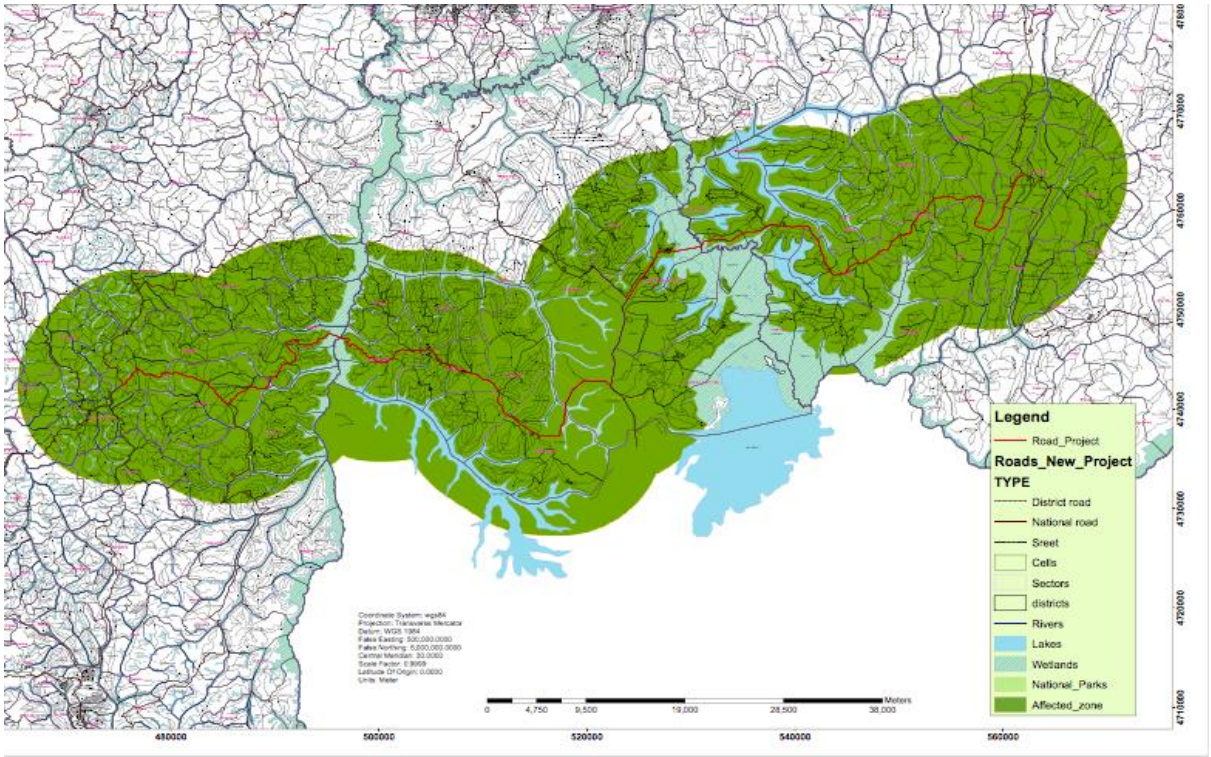

Figure 4-5: Project area of influence (10km) with lakes, rivers and wetalnds

4.2 The Biological environment

Ngoma-Nyanza project region is found in the southeastern plains of Rwanda's Eastern Province and a part of Southern Province. The overall Project area includes different botanic-geographic regions with diversity of flora and vegetation due to geological, geo-morphological, hydrological and soil conditions. In particular, project and impact area includes riparian habitats along wetlands around Akanyaru-Akagera River system, shrubs; agricultural lands; and other more or less transformed areas.

During this study, site-specific data on flora and fauna were collected for the study area. The data were evaluated and particular attention was given to the species of national and international concern (IUCN, BERN, CITES) and their habitats.

4.2.1 Ngoma

Flora

The natural vegetation of the district of Ngoma is dominated by savanna landscapes. It is a typical vegetation of the east African basin, with vast lands of grass with scattered shrubs of the natural vegetation dominated by savanna landscapes. The western part of the district is made up of vast wetlands constituted by depressions of fluvio-lakes of the Akagera that offers a typical landscape of lakes and swamps. As the District Natural ecosystems have disappeared, leaving room for crops and artificial forests which mainly consist of large banana plantations with the combination of avocado, mangoes, sweet potatoes, cassava, etc. The majority of the current afforested area consists of Eucalyptus and Pinus.

Fauna

Wildlife no longer exists in the region for a long time except for some birds, small mammals and reptiles encountered in the less frequented places.

4.2.2 Bugesera

Flora

Bugesera is predominantly vegetated by dry savannas, which are characterized by short grasses, shrubs and short trees characteristic of arid and semi-arid areas. In the northern parts of Bugesera, which have short hills and moist valleys, shrubs are the dominant vegetation on hillsides, while *Cyperus* species (including papyrus) are found along the rivers and streams. Throughout Bugesera, particularly in the north and central parts, which are relatively more transformed than the south, *Lantana camara*, an invasive plant native to South America, is common, and has proved to be resilient in the aftermath of the harsh drought that has persisted in Bugesera over the last 6 years[3]

Plate 1 shows the typical natural vegetation of Bugesera. Part of the Gako military domain where the thick natural wood lands still exist, is in the background.

[3] Experco 2003

Figure 4-6: Typical natural vegetation of Bugesera. Part of the Gako military domain

Located in Bugesera District, Mayange Sector in the Eastern Province, Gako military domain is a natural dry forest characterized by diversified habitats. It is not a national park and is located far from the Akagera National Park. The main patterns are composed of xerophyte plants and tiger bushes. Gako military domain makes part of the Bugesera savanna relicts and is adjacent to Kanama forest, separated by the tarmac road in the East.

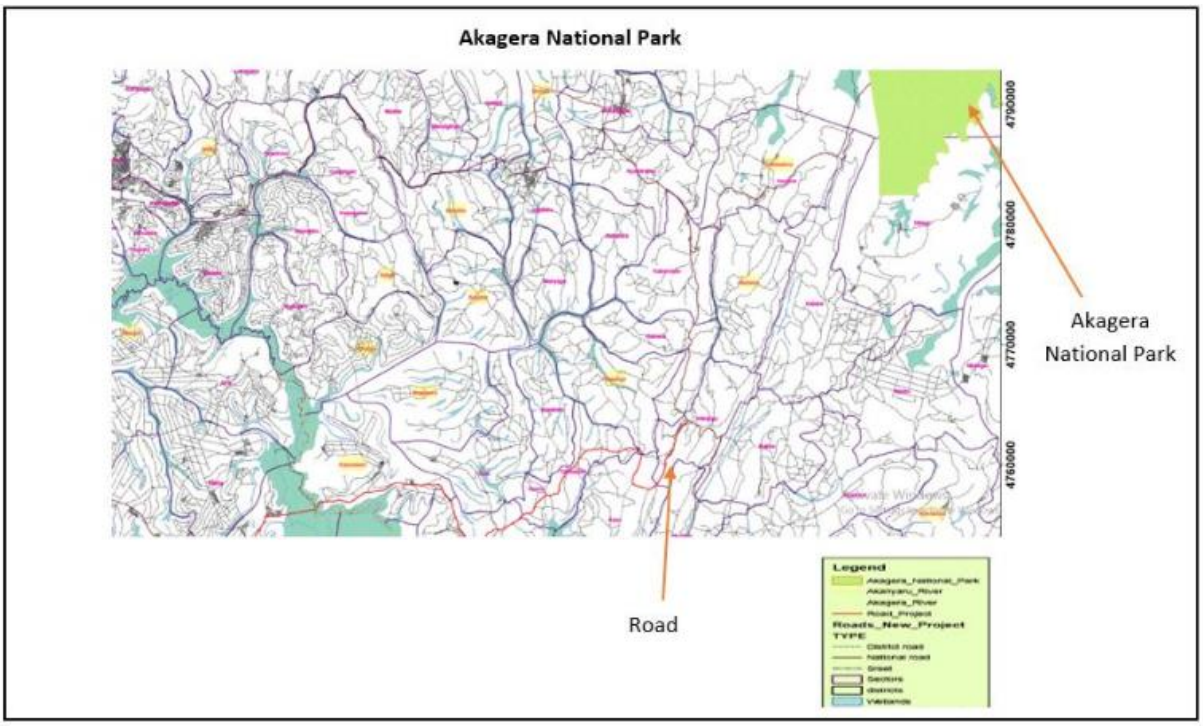

Figure 4-7: Location of Akagera National Park in relation to the project site (road)

Fauna

Today the District is largely inhabited, but still has some land for other various activities. The colonization of this former reserve of hunt and vast prairies started in 1960s following the flooding that destroyed the fields and the dwellings in the valley of the Akagera on the one hand; and with the flux of immigrants from other regions and provinces of the country in search of farm land on the other hand. The various wild animal species were forced into exodus toward the Akagera National Park, located out of zone of influence of the project. Nevertheless, one finds the anteaters, mice, a multitude of species; birds live either in the bushes, the groves, the big trees or the terriers.

In the lakes, the marshes and the Nyabarongo, Akanyaru and Akagera rivers one can find hippos, the Crocodiles, the turtles, the water birds, the ducks and the wild geese. The lakes of the district contain fish such as Tilapia, clarias, soles, silurids, etc.

New fish species were originally introduced into Lakes Muhazi, Kigembe and Kiganwa and river Nyabarongo, and found their way into all Lakes in Bugesera (MINITERE/Experco 2003). These alien species, particularly the Nile tilapia, have had devastating effects on the aquatic biodiversity, as they predate on the native fish species, resulting in extinction of some other species[4]. Water hyacinth (*Eichhornia crassipes*), a native of south and Central America, is visible in or along all water bodies in Bugesera. The massive sediment deposit that comes from the upper catchments of River Nyabarongo contributes to the proliferation of the water hyacinth and other weeds.

4.2.3 Nyanza

Flora

The natural vegetation of the district is gradually disappearing with human occupation. In terms of reforestation, the predominant species are eucalyptus, pine, cypress, Grevillea.

Fauna

As for wildlife, there are many species of small wild animals and insects including: Toads, frogs, birds of many kinds, reptiles, etc.

4.2.4 Sensitive ecosystems

The road Ngoma-Nyanza road traverses three important natural habitats; Gako military domain, Akagera wetlands and Akanyaru wetlands. Gako military domain plays an important role as a refuge to many flora and fauna species. Akanyaru wetland was recognized recently as an Important Birding Area while the Akagera wetland complex was proposed to be a RAMSAR site. These three natural habitats are identified in the project area of influence, hosting important biodiversity including IUCN red list species, i.e. Malagasy pond-heron.
As mentioned earlier, when Nyabarongo flows to the South-east, it forms the main tributary of the Kagera River and so its wetlands are not crossed by Ngoma-Nyanza road to be upgraded.

[4] **(MINITERE/ Experco 2003).**

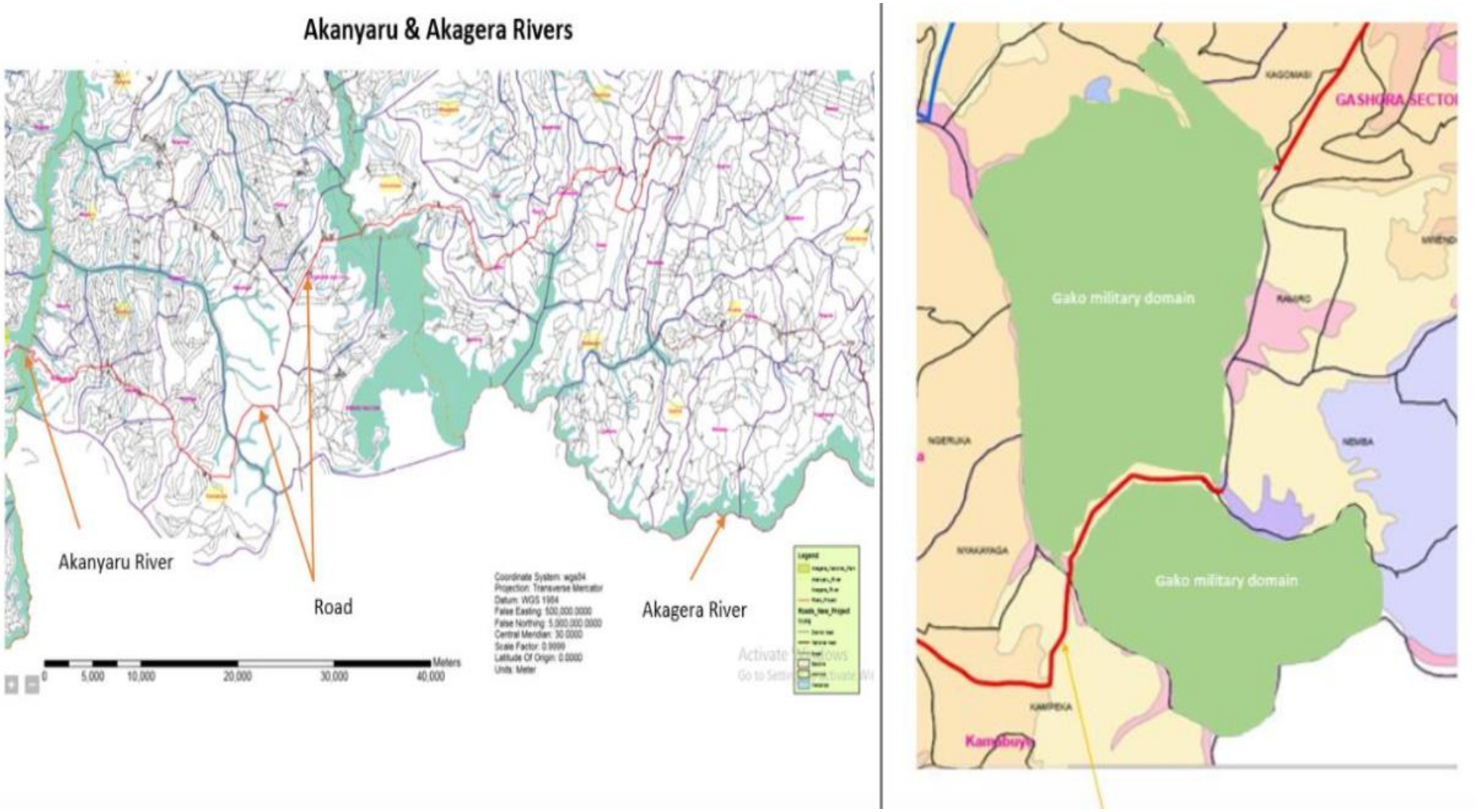

Figure 4-8: The road crossing Gako military domain, Akanyaru and Akagera Rivers

In addition to these three natural habitats, the road traverses some other wetlands as per the table 3.3 on rivers crossed by the road.

Gako

Gako military domain is rich in plant diversity dominated by trees and shrubs of Rhus natalensis, Grewia similis, Grewia bicolor, Acokanthera schimperi, Vepris nobilis, Afrocanthium lactescens, Psydrax schimperiana, Euphorbia candelabrum, Osyris lanceolata, Olea europea var. Africana, Pappea capensis, Euclea schimper, Haplocoelum foliorosum, Ozoroa insignis, Dichrostachys cinerea, Strychmos lucens, Markhamia obstusifolia, Boscia angustifolia var. corymbosa, Acacia hockii, Acacia gerardii, Capparis tomentosa, Carissa eduli, Maytenus senegalensis, Lannea fulva, Combretum molle, Gardenia ternifolia, Flacourtia indica, Scutia myrtina, Ximenia caffra (preferred edible fruit tree), Kigelia africana. Most of these species are used for various purposes particularly in traditional medicine[5].

This military domain is also rich in orchid species among which Microcoelia is the dominant genera. Some herbaceous species characteristics of low altitude savannas and xerophyllous forest are also abundant. Some of them are Themeda triandra, Hyparrhenia filipendula, Sporobolus pyramidalis, Loudetia simplex, Asparagus africanus. Alongside the Kirimbi Lake, many species of Cyperus sp. are observed.

Gako military domain plays a big role by providing edible and medicinal plants. Indeed, several plant species that it hosts are used to manufacture drugs by traditional healers to cure certain particular affections of which bites of the snakes relatively frequent in this area.

Furthermore, Gako plays an important **ecological** role in preventing erosion and eutrophication of surrounding aquatic systems. It also contributes in climate mitigation by reducing evaporation on water surface.

Concerning the wild fauna, the forest is home to mammals like rabbits, Grivet monkey (Chlorocebus aethiops) and Egyptian mongoose (Herpestes ichneumon).

Gako military domain plays an important role as a refuge to many grassland and woodland snakes. These include Naja nigricollis, Naja melanoleuca, Vipera aspic and Opheodrys vernalis. On the side of the lakes, there live also snakes related to areas of permanent water like Python sebae.

Some bird species were also recorded (Ceuthmochares aereus, Streptopelis senegalensis, Lamprotornis purpuropterus, Francolinus nobilis, Bulbucus ibis, Pycnonotus barbatus, Ceryle rudis and Cossypha caffra).

The grey crowned crane/ Balearica regulorum can be observed from different areas of Gako military domain.

The forest serves as food source and habitat for different animals as well as bird nests for bird species. Gako military domain contributes in general in the maintenance of the ecological balance of the Bugesera region (rainfall regulation, soil cover and improvement…)[6].

Akanyaru wetlands

The vegetation of Akanyaru wetlands consists of a variety of marshy habitats and papyrus swamp. Early successional stages are occupied by floating vegetation dominated by *Pistia stratiotes*, *Leersia hexandra* and *Oryza barthii*. Intermediate stages are a mixture of *Typha australis*,

[5] **Bizuru E & al, 2011**

[6] **Bizuru E & al, 2011**

Miscanthidium violaceum, *Cladium jamaicense* and some papyrus[7]. More complex habitats are occupied by *Typha australis*, *Miscanthidium violaceum*, *Cyperus denudatus*, *Cyperus latifolius* and *Echinochloa pyramidalis.* There are expanses of papyrus, either as pure stands or combined with shrubby vegetation. Average annual rainfall is estimated to be 800 mm.

Birding Importance

The birding site' strength lies in the availability of over 54 species of wetland habitats. The Akanyaru wetlands were identified as an Important Bird (RW005) through Birdlife International criteria A1 and A3 (A06). Akanyaru is a home of IUCN bird species including Papyrus Gonolek "*Laniarius mufumbiri*" (NT), Papyrus Yellow Warbler "*Chloropeta gracilirostris*" (VU) and Madagascar Pond Heron "*Ardeola idea*" (EN)[8]. The wetlands are also a home of Sitatunga, an a CITES listed mammal. The papyrus places are the shelter of Blue Monkeys (*Cercopithecus mitis dogetii*) and snakes, while waterway shelters Hippopotamus, Crocodiles and unidentified Fishes.

Figure 4-9: The ***Common Squacco Heron and Malagasy Pond Heron***

IUCN and CITES listed species

The threatened species are key species for conservation of a site hence their presence/absence could be used as an indicator of the importance of a site for conservation. **Malagasy Pond Heron**, an IUCN endangered species was recorded in the Northern of Akanyaru wetlands, near the junction to the Nyabarongo wetlands[9]. Four bird species listed by CITES were recorded and these include **Egyptian Goose, Hadada Ibis, Little Egret and Sacred ibis**.

Table 4-3: IUCN and CITES species of Akanyaru wetland[10]

Type	IUCN and CITES bird species
Bird	Egyptian Goose (CITES listed bird)
Bird	Hadada Ibis (CITES listed bird)

[7] **http://aviansafaris.com/birding-rwanda/important-bird-areas/akanyaru-wetlands**
[8] https://www.africanbirdclub.org/sites/default/files/2008_Akanyura_Wetland_Survey_Rwanda_0.pdf
[9] **https://www.africanbirdclub.org/sites/default/files/2008_Akanyura_Wetland_Survey_Rwanda_0.pdf**
[10] **Bizuru E & al, 2011**

Bird	Little Egret (CITES listed bird)
Bird	Sacred ibis (CITES listed bird)
Bird	Papyrus Gonolek "*Laniarius mufumbiri*" (NT)
Bird	Papyrus Yellow Warbler "*Chloropeta gracilirostris*" (VU)
Bird	Madagascar Pond Heron "*Ardeola idea*" (EN) IUCN listed
Type	**Mammal CITES species**
Mammal	Sitatunga (CITES listed mammal)

Akagera wetlands

Flora

Akagera swamp is covered by Papyrus reed classified as Cypero papyri-Dryopteridetum gongylodis, which forms a species-poor plant community with dominating Cyperus papyrus. Other reed communities are the Phragmitetum mauritiani with dominating Phragmites mauritianus, the Echinochloetum pyramidalis and the Cyperetum latifolii. Another community dominated by small shrubs is characterized by Syzygium cordatum. and Myrica kandtiana. Along the lakes, a community with Sesbania sesban and Phoenix reclinata is developed (Sesbanio-Phoenicetum reclinatae). Also stands of Aeschynomene elaphroxylon and Mimosa pigra occur. Communities of aquatic plants, e.g. the Nymphaeetum callianthomildbraedii with Nymphaea lotus and Nymphaea nouchalii, and the Ceratophylletum demersi, colonize the open water surfaces. A number of vascular plant species has been recorded in the Akagera swamp, 77 in Akagera complex[11].

[11] **Bizuru E & al, 2011**

Figure 4-10: Cypero papyri-Dryopteridetum gongylodis

Figure 4-11: Syzygium cordatum

Two remarkable and rare orchid species, Eulophia angolensis and Eulophia guineensis, occur in the Akagera Complex. Especially Eulophia angolensis is restricted to swamps and reed habitats. The species was formerly widespread in Rwanda, but is rapidly declining actually due to swamp draining and conversion into agricultural landscape.

Figure 4-12: Eulophia angolensis

Table 4-4: Endangered plant species of Akagera wetland[12]

Type	Endangered plant species
Plant (orchid species)	Eulophia angolensis
Plant (orchid species)	Eulophia guineensis

Fauna

Amphibians

A number of amphibian species have been recorded in the Akagera swamp, 16 species in Akagera complex with no endangered species in the project area. Among the 16 species, the following are common:

- *Afrixalus quadrivittatus*
- *Amietophrynus regularis*
- *Hylarana albolabris*

[12] **Eberhard, 2011**

- *Hylarana galamensis*
- *Hyperolius acuticeps*

***Figure 4-13*: *Hyperolius acuticeps* (above left), *Hyperolius kivuensis* (above right), *Hyperolius viridiflavus* (below).**

Reptiles

A total of 13 reptile species has been recorded, among them no Albertine Rift Endemic or endangered Species. Among the 13 species, the following are common:

Bitis arietans – Puff Adder
Dasypeltis scabra.
Grayia tholloni – Thollon's Water Snake
Kinixys spekii – Speke's Hinged Tortoise
Naja melanoleuca – Forest Cobra
Naja nigricollis – Black-necked Spitting Cobra

Birds

The Akagera Complex with 54 species is by far the most bird species-rich swamp. However, no Albertine Rift Endemic species has been recorded. The project site no endagered species are present, however, Malagasy Pond Heron has been sited in the Akagera complex. Among the 54 species, the following are common:

Casmerodius albus,
Ceryle rudis,
Scopus umbretta
Ploceus cucullatus.

.

***Figure 4-14*: *Casmerodius albus* (above left), *Ceryle rudis* (above right), *Scopus umbretta* (below).**

4.2.5 Ecological Functions of Akagera and Akanyaru wetlands

Wetlands are among the most productive aquatic ecosystems in Rwanda, performing valuable ecological, social and economic functions. Generally, the two wetlands serve as reservoirs and purifiers of fresh water. They attenuate peak flows, storing water and releasing it back gradually and allowing for year- round stream flow. They act as flood buffers and sink for sediments (including clay soluble inorganic nutrients); regulate climate; and contain large deposits of peat valued for its energy potential but more specifically the have the following salient functions:

Akanyaru: Support agriculture, artisanal fishing and have potential for transport;

Akagera wetland: Hydropower, agriculture and navigation and tourism

4.3 Socio-economic environment

4.3.1 Population and Demography

Ngoma-Nyanza road crosses three districts that have in total a population estimated to 1,021,000

Ngoma

The population of Ngoma district is estimated at 323,000; about 55% are aged 19 years or younger. People aged 65 years and above make up 4% of the population. The majority is young, with about 83% still less than 40 years of age. The average size of the household in Ngoma district (4.8) is similar to the national average household size[13].

Table 4-5: Populations of Ngoma sectors crossed by the road

Number	Sector	Population
1.	Rukumberi	28560
2.	Sake	23703
3.	Gashanda	16309
4.	Rurenge	28555
5.	Kazo	27318
6.	Kibungo	28338
Total		**152783**

Bugesera

The EICV 3 results show that the population of Bugesera 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 population is made up of female individuals.

The average size of the households in Bugesera district is 4.9, which is slightly higher than the national average household size.

Table 4-6: Populations of Bugesera sectors crossed by the road

Number	Sector	Populations
1.	Nyarugenge	20753
2.	Ruhuha	22994
3.	Ngeruka	30717

[13] **EICV2, 2012**

4.	Kamabuye	20843
5.	Mayange	29835
6.	Gashora	22001
Total		**147143**

Nyanza

According to the EICV 3 the population of Nyanza district is 307,000. About 54% are aged 19 years or younger. People aged 65 years and above make up 4.8% of the population. About 53% of the population is constituted by female. The average of household in Nyanza is below the national average household size (4.6%).

Table 4-7: Populations of Nyanza sectors crossed by the road

Number	Sector	Population
1.	Kigoma	35297
2.	Muyira	35544
3.	Busoro	34037
Total		**104878**

4.3.2 Employments/Economic trends/Occupation/incomes

Commonly for the three districts agriculture is practiced as a labour intensive, intercropping system with both cash crops and subsistence crops. Women are responsible for food supply and other household duties whereas men are responsible for cash income including cash crops. In addition, women generally do not own family land but merely have access to it. All of this has inhibited women's economic advancement by blocking avenues to credit schemes.

Ngoma

In Ngoma District, the employment rate is 85% of the resident population aged 16 years and above while the economic inactivity rate of 13.9%[14]. Most people aged 16 years and above are independent farmers. Most people aged 16 years and above are independent farmers (73.5%), followed by wage non-farmer work (9.3%). The third main jobs are wage farm and independent non-farmer with 8.3% each. The mean size of land cultivated per household in Ngoma district is 0.86 ha. While the commercialisation of crop production overall, as measured by the share of harvest sold (including *households selling zero crops*), is 19.6% in Bugesera, it is 23.6% in Nyanza.

Bugesera

[14] **EICV3, 2011**

Concerning employment, Bugesera shows rates close to the national average. The overall employment rate is 85% of the resident population aged 16 years and above in Bugesera District; the economic inactivity rate of 14% in Bugesera.

With reference to the type of usual main job Bugesera district shows that most people aged 16 years and above are independent farmers (68%), followed by wage non-farmer work (14%), The third main jobs are wage farm and independent non-farmer with 8% each.

With reference to the land cultivated per household (in ha), by district, the mean size of land cultivated per household in Bugesera district is 0.88 ha which makes it the third highest mean size in the whole country after Muhanga and Musanze. Commercialisation of crop production overall, is 19.6% in Bugesera district.

Nyanza

The overall employment rate is 82% of the resident population aged 16 years and above in the district, with the unemployment rate of 0.4% and the economic inactivity rate of 17.4%[15].

With reference to the type of usual main job in Nyanza district shows that most people aged 16 years and above in Nyanza are independent farmers, with 71% having this as their main occupation. The next most frequent main jobs are wage farm and wage non-farm work with 11% of individuals in these occupations respectively. Only 6% are working in independent non-farm businesses.

With reference to the land cultivated per household (in ha), by district, the mean size of land cultivated per household in Nyanza district is 0.52 ha. Nyanza district is among the many districts, largely in the south, west and north of the country, that have a high percentage of households (88%) that cultivate under 0.9 ha of land.[16] Commercialisation of crop production overall, is 23% in Nyanza district.

Household's economic indicators in three districts (sample: PAPs)

Table 4-8: Main and other Occupation of the head of the family

District	Salaried	Farmer	Business	Skilled trade	Total
Nyanza	2	250	110	52	412
Bugesera	1	155	124	41	320
Ngoma	1	123	20	24	167
Total	4	528	254	117	899
Percentage	0.4	59	28	13	100

Source: Primary data, Eco Design & Protection Ltd, July 2016

As the table above explains, some diversification of activities for heads of household is observed within people living on the shore of Nyanza-Ngoma unpaved road. However, given the rural setting in which they live, the majority of respondents are occupied with farming (59%), followed by business and skills related activities namely trade, carpentry, masonry, weaver, electricity works etc. Only 0.4% of respondents are salaried employees. This means that, not only vocational training planning and courses need to be availed in the areas of this study, but also mostly business activities should be given a priority. This will require

[15] **EICV3, 2011**

[16] **The Food and Agriculture Organisation (FAO) estimates that on average a Rwandan household requires at least 0.9ha to conduct sustainable agriculture (National Land Policy Report).**

encouragement of small-scale businessmen/women by providing them with necessary entrepreneurial knowledge. The same will be applied to vocational training education programs, which might bring an input to the development of skilled labour force in the areas targeted by this study.

Table 4-9: Average Annual income of PAPs in the road's neighborhoods

	Frequency	Pourcentage
Average income under 100000 RWF	5	0.6
Average income between 100001 to 500000 RWF	11	1.2
Average income between 500001 to 1000000 RWF	880	97.9
Total	896	99.7
Missing	3	0.3
	899	100

Source: Primary data, RTDA, July 2016

The average annual income of PAPs lay between 100000Rwf to 1000000Rwf for 99% of all PAPs. A very small proportion of the later earn less than 100000Rwf per year.

Total land used by household

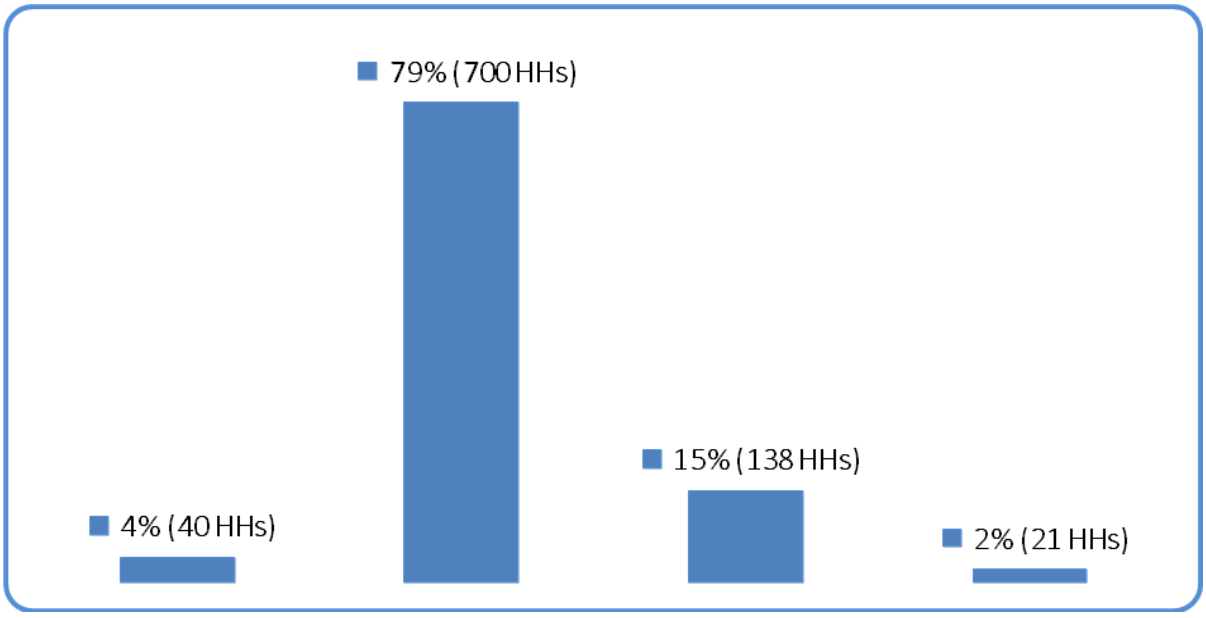

Figure 4-15: Percentage of total land used by head of the household

Source: *Primary data, RTDA, July 2016*

The bar chart above present the proportion of land used by heads of households in different districts covered along the survey. In general, we notice that a big number of respondents have between 0 and 2 ha (79%), while some other few members share the remaining proportion with, 15% exploiting between 2 and 5 ha, 2% having greater than 5 ha. The big portion of land possessed by inhabitants of this area can be useful if the land consolidation policy is properly implemented in the area.

4.3.3 Agriculture

Ngoma
Agriculture is the main economic activity in Ngoma District. According to EICV3, 86.1% of the population is economically active while inactive among the persons aged 16+ is 13.9%. The main usual job is agriculture with 81% of Ngoma district population against 73.5% at the national level. The majority of the population (73.5%) works on their own farm against 61.8% at the national level[17].

Bugesera
The mean size of land cultivated per household in Bugesera district is 0.86 ha. Bugesera district is also among the districts that have relatively high mean sizes of land cultivated (in the interval of >0.75-0.97 ha) but still have a high percentage (71%) of cultivating households that cultivate under 0.9 ha of land[18].

Nyanza
A large part of the population of Nyanza lives on subsistence farming, therefore dispersed settlements and strongly fragmented agricultural areas are characteristic for the cultural landscape in this region. In addition, subsistence farming and the small-scale cultivation of land is deeply rooted in the country's culture, and the topography makes large-scale, industrially characterized agriculture difficult. An important issue is to find out how agriculture and the settlement structure should be designed and organized in the future to satisfy most of the food requirement for the long term and to operate resource-conserving with regard to landscape, ecosystems and objects of cultural value at the same time. Topics such as ecological farming, organic food, finishing, and direct marketing are not only gaining importance worldwide, but contribute to strengthening the regional economy and to creating local added value.

4.3.4 Infrastructure

Road Transport
The transport system in Rwanda centres primarily on the road network. Paved roads lie between the capital, Kigali, and most other major cities and towns in the country.

Ngoma
In terms of satisfaction and perception of change in quality of the roads network, we noted 55.3% of the users in Ngoma district feel that the quality of roads does not change and only 37.1% feel some improvement. The situation is similar countrywide because 59.3% don't feel any improvement in road quality compared to 34.5% who do feel some improvement. Likewise, 25.1% of the district households are not satisfied with their nearest roads compared to 33.6% of household's national wide[19].

Bugesera
Although the Bugesera district counts a significant number of feeder roads, which connect it with other districts and within the district connecting sectors, the majority of them are not repaired and those that have been repaired are not well maintained. We noted 62.3% of the

[17] **Nyanza DDP, 2013-1018**
[18] **Bugesera DDP, 2013-2018**
[19] **Ngoma DDP, 2013-2018**

users in Ngoma district feel that the quality of roads does not change and only 39.3% feel some improvement.

Nyanza

The road network of the district of Nyanza is dense (394 km)[20], generally practicable but in poor condition. It is mainly composed of dirt roads. The paved road network incorporates the Kigali-Akanyaru national road crossing the district as well as the Bigega-Rwesero section only through the town of Nyanza. The roads remain in poor condition and require rehabilitation, as well as that of the adjoining bridges. 61.9% were reported not to be satisfied by the current road network.

Electricity

The primary sources of energy used for lighting by households were categorized as follows: electricity, oil lamp, firewood, candle, lantern, battery, and other unspecified sources.

The map presented in the figure below presents the distribution of households using electricity as the main source of lighting by district. In the three districts crossed by the road, the percentage of households using electricity as the main source of lightning is for the three districts 1.6-6% HH

On average, urban areas have 46.1% of households using electricity as their main source of lighting, while it is only 4.8% in rural areas and 10.8% at national level.

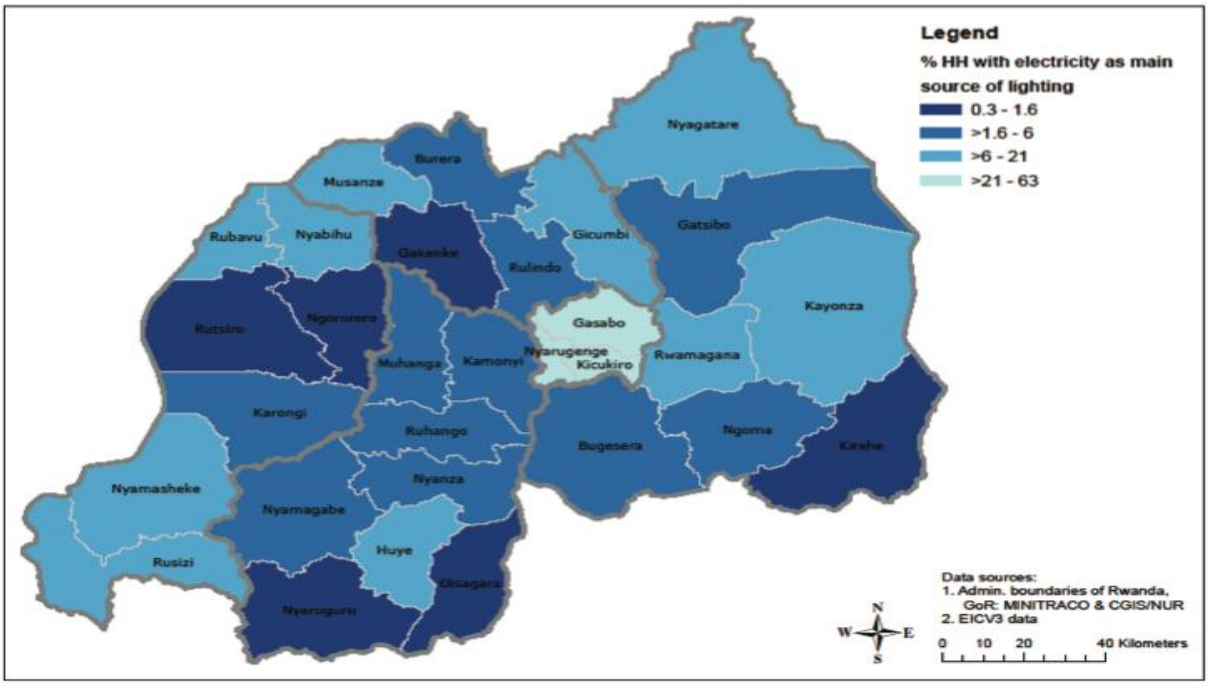

Figure 4-16: Percentage of households using electricity as main source of lightning by district[21]

ICT

Ngoma

[20] Nyanza DDP, 2013-1018

[21] EICV3, 2011

According to the EICV3 report (2011), only 0.7% of population own computers for Ngoma, which is far below the national level of 1.7%. This implies that the district needs to be developed further to achieve the national targets.

Bugesera
3.1% of the Bugesera population aged six and above in Bugesera district have used a computer before and would feel confident using one again, ranking the district 11th among all districts.

Nyanza
The survey results show that 1.4% of the population aged six years and above in Nyanza district has used a computer before and would feel confident using one again. It is ranked 10th from bottom among all districts and is below the national average.
Among the urban population 14% can be classified as computer literate, but this applies to only 2% of the rural population. Only 4% at national level can be classified as computer literate.

Housing
Over 90% of households in Rwanda live in single-household dwellings and this proportion has slightly decreased since 2010/11.
The main wall materials of dwellings were classified as follows: mud bricks, mud bricks covered with cement, tree trunks with mud, tree trunks with mud and cement, oven-fired brick, and other unspecified material.
The figure below describes the construction material used for flooring by district.

Ngoma
It shows that the cement flooring is equivalent to 13% for Ngoma.

Bugesera
Cement flooring is equivalent to 18% for Bugesera. In Bugesera, beaten earth is the material most commonly used for flooring (82%).

Nyanza
EICV3 results also show that half of urban households use a cement flooring material, but at national level, the figure is only 17%. Cement flooring is equivalent to 15% for Nyanza.

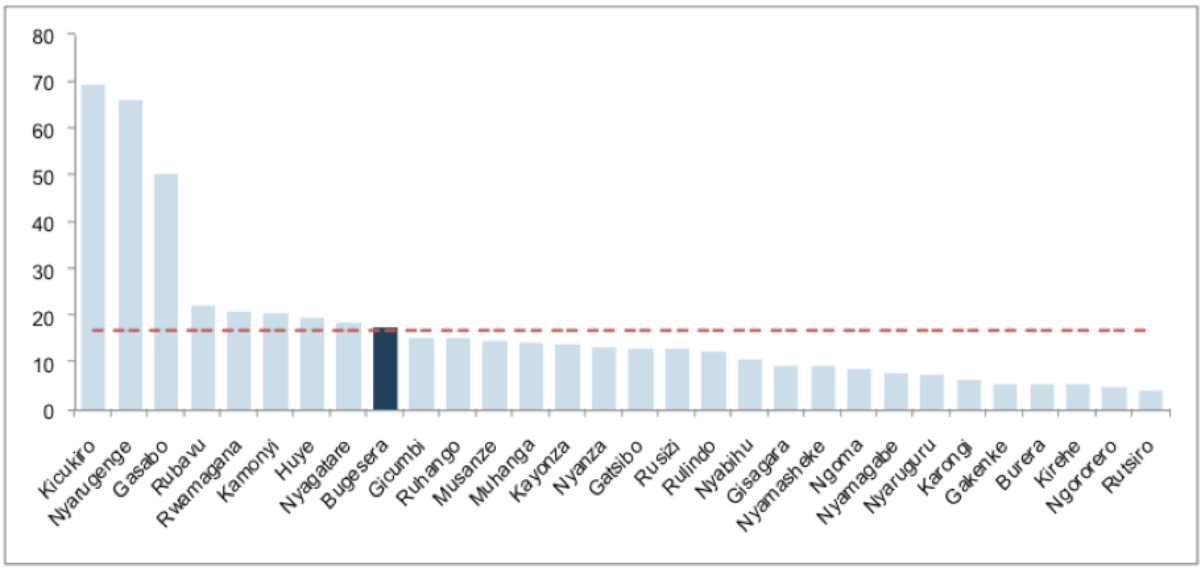

Figure 4-17: Percentage of households with cement floor, per district

Water and sanitation

The survey results show that around 67.6% of Ngoma households have access to safe water including (74.2%) of households using an improved water source with 40.7% of households using protected springs, 11.6% using stand pipe, 1.3% having water piped into their dwelling/yard. Only 34.4% of Ngoma households are within 5-14 minutes of main drinking water source while 18.9% are within 15-29 minutes[22].

Bugesera

71% of Bugesera district household use an improved drinking water source according to EICV3 results. 29% of households still use an unimproved drinking water, including 24% using surface water, from rivers and lakes.

Nyanza

The survey results show that 82% of Nyanza district households use an improved drinking water source. 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 Organisation (WHO). The majority of households in Nyanza use a protected spring (62%) followed by a public standpipe (15.5%), with 4.2% using another improved water source. However, 17.8% of households in Nyanza district still use an unimproved drinking water source.

[22] **EICV3, 2011**

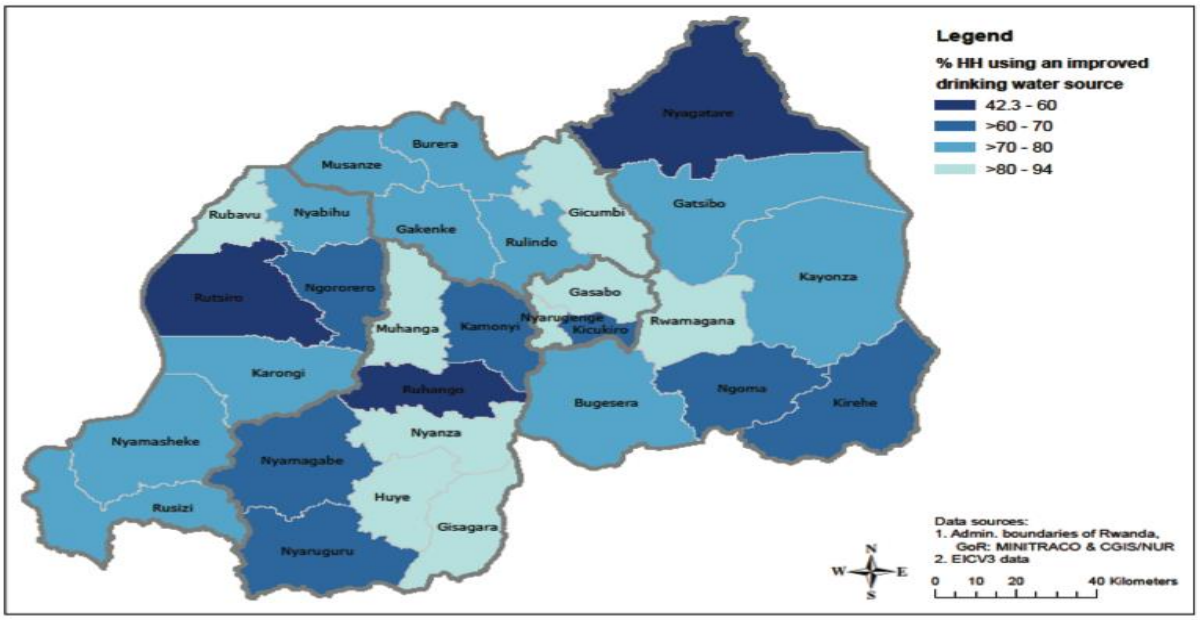

Figure 4-18: Percentage of households using an improved drinking water source by district[23].

Education/Schools

Rwanda vision 2020 acknowledges Rwanda as suffering from serious deficiencies in terms of trained human capital and states it as its major objective. The creation of knowledge based and technology-led economy for which comprehensive human resources development is considered to be one of the necessary pillars for Rwanda to reach the status of a middle-income country. The table below gives the school enrolment rates, literacy rates for the different rates and shows a big effort is needed to reach the targets

Table 4-10: School enrolment and literacy rates of the concerned districts[24]

District	Primary school enrolment	Secondary school enrolment	Literacy rate Persons aged 15-24	Adult literacy rate
Bugesera	87.7	-	81	72.9
Ngoma	86.7	37.9	84.5	70.5
Nyanza	57.4	37.4	84.3	65.5

[23] EICV3, 2011
[24] EICV3, 2011

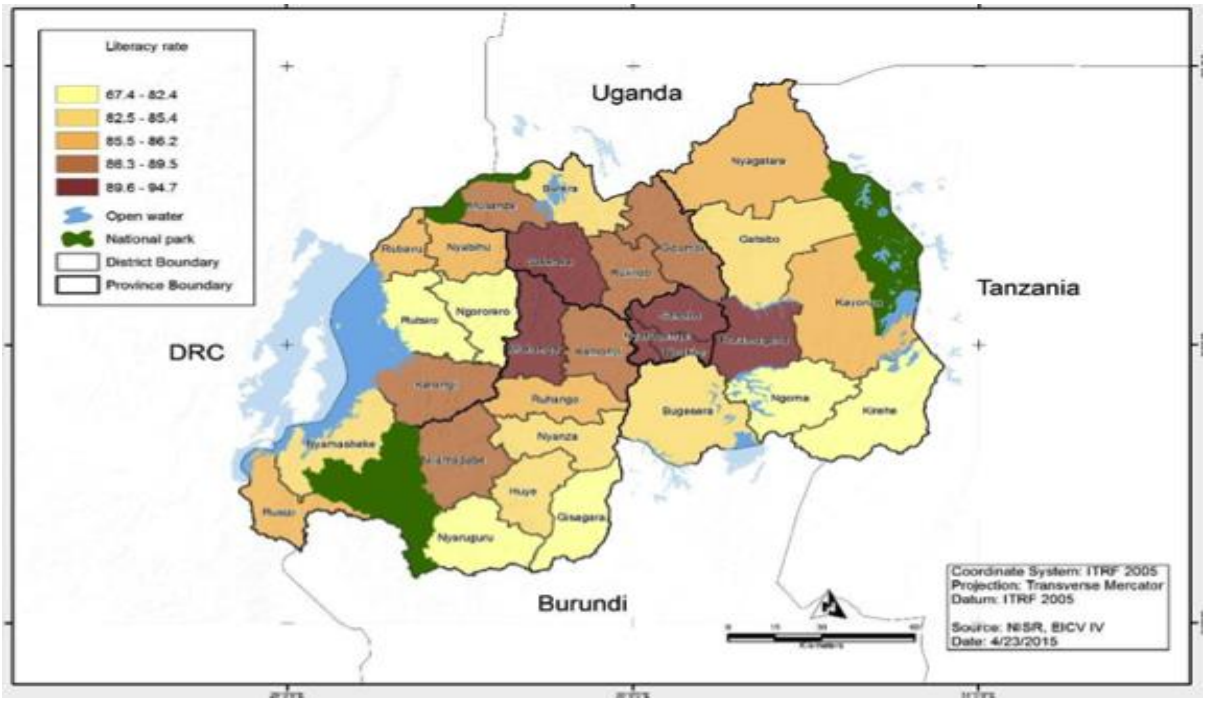

Figure 4-19: Literacy rate (%) of population aged 15–24 years, at district level

Health

Access to and use of social services

The three districts concerned still need to increase the number of Health Centres and posts, maintaining the rate of medical insurance possession amongst the population including other priorities such as construction and equipment of Health Centres and Health Posts, strengthen family planning methods, Health insurance and women delivering.

Walking distance to basic services can be considered an indicator of both provision and coverage of health service and the remoteness of households' dwellings. This basic service was categorized into Health Centre.

Table 4-11: Health services and status in the concerned districts[25]

District	Mean walking distance to a health centre (min)
Bugesera	60-74.5
Ngoma	45-60
Nyanza	45-60

[25]EICV3, 2011

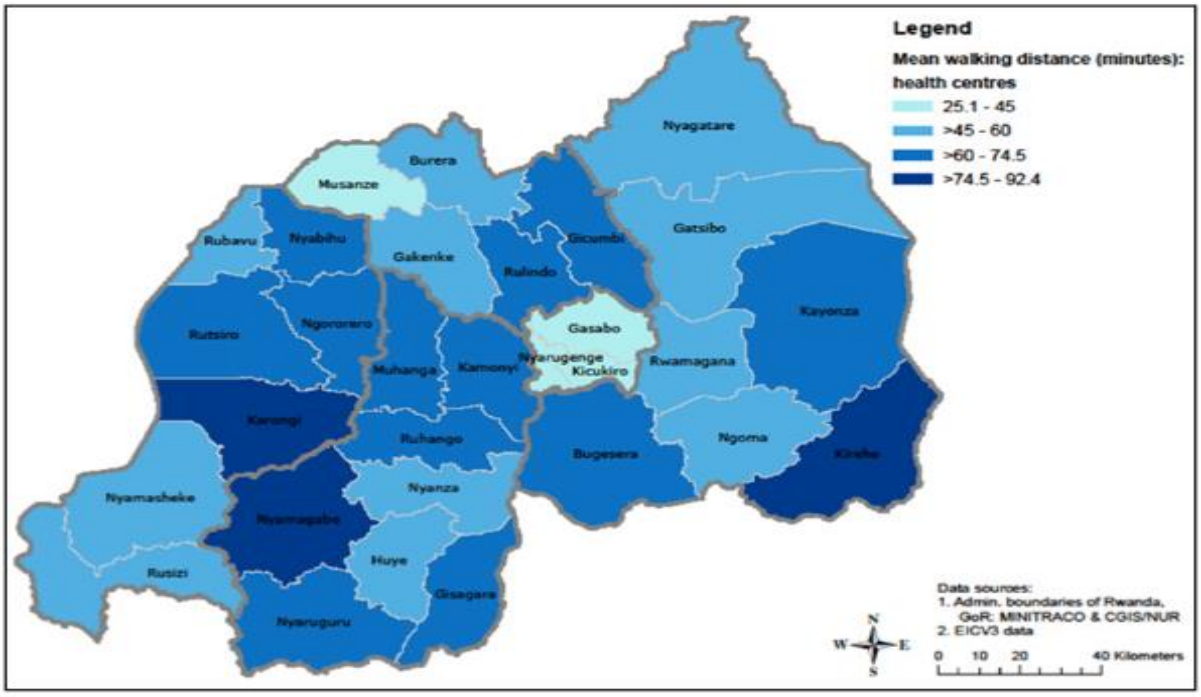

Figure 4-20: Mean walking distance to the nearest health

The above EICV results were compared to our census results. For a period of three years, 2013 to 2016, new facilities have been constructed and the distances to social facilities have reduced but not significantly.

Distance to the nearest socio-service

The Table below illustrates the average distance (km) to nearest social services and family land size in the three district of the study area. The results are average of two sectors of three districts crossed by the road.

The average distance of primary school range between 0.9 and 1.7 km; the health centers are located within 2.9 and 3.3 km; the average market distance are between 0.2 and 5.5 km. The population in Busororo is the most located in long distance to the market (5.5 km). 95% of the population confirms that the social services (i.e. school, health centers and market) are a challenge in their area. As for land size per family, it was fund that the average land size ranges between 0.2 and 0.26 ha.

Table 4-12: Distance to the nearest socio-service (km)[26]

Sector	Primary School	Health centre	Market	Mean	Min	Max
Bugesera	0.9	1.4	1.1	0.3	0	2
Ngoma	1.7	3.3	0.2	0.2	0	2
Nyanza	1.6	2.9	5.5	0.26	0	1

[26] EICV3, 2011

Vulnerability and gender

Groups that are considered particularly vulnerable by the Government of Rwanda are children under five years old, elderly people aged 60 and over and people with disabilities. In development projects requiring the relocation of PAPs, some more groups of people fall in the category of vulnerable people. These include widows and divorced people who might face difficulties in moving with children with a need to cater for them. The table below presents categories of vulnerable PAPs in the area to be crossed by Nyanza-Ngoma road.

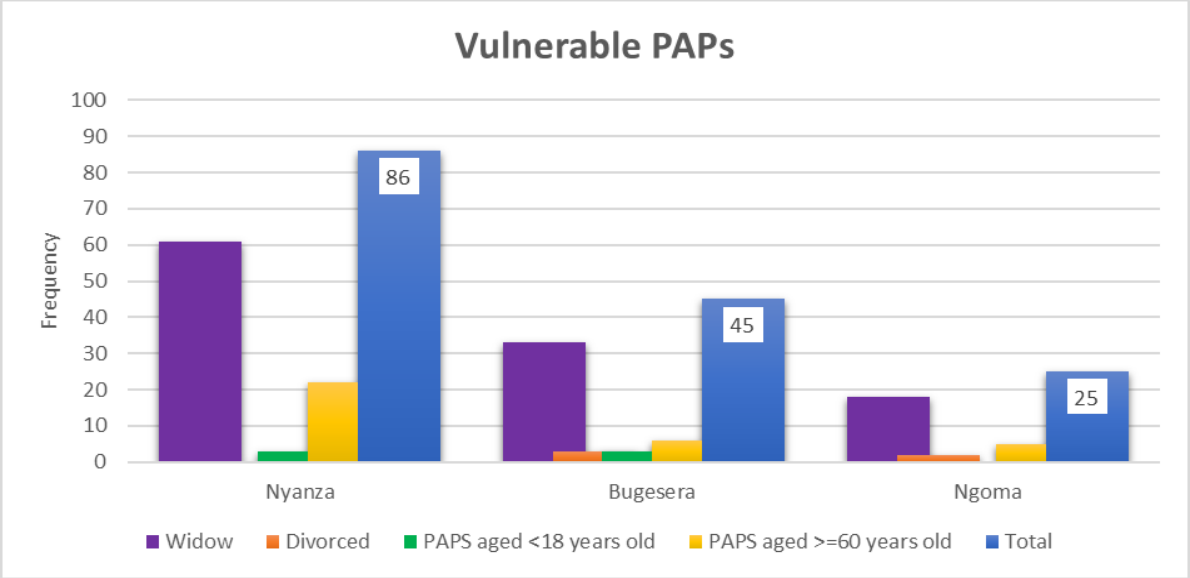

Figure 4-21: Vulnerable people (sample of PAPs)

Source: *Primary data, RTDA July 2016*

As the diagram above shows, vulnerable PAPs are mostly located in Nyanza district, which is followed by Bugesera and lastly Ngoma. Vulnerable people are predominantly widows (n=97) with 58% of all people in the road neighbourhoods. The second category of vulnerable people is that of elderly persons who are aged between 60 years and beyond and are 37% of all respondents. The remaining vulnerable groups who are only 5% of all people are either divorcees or orphan children of less than 18 years who head their households.

Gender status in districts crossed by the road

Table 4-13: Population distribution by gender in districts crossed by the road

District	Both sexes	Male	Female	% of Male	% of Female	Density (Inhabitants / km2)
Rwanda	**10,515,973**	**5,064,868**	**5,451,105**	**48.2**	**51.8**	**415**
Nyanza	323,719	157,650	166,069	**48.7**	**51.3**	482
Bugesera	361,914	176,210	185,704	48.7	51.3	280
Ngoma	336,928	161,769	175,159	48	52	287

Source: Rwanda 4th Population and Housing Census, 2012(NISR)

Female population constitutes a slightly higher proportion in the entire Rwanda with 51.8%.

Ngoma
In districts to be crossed by the Nyanza-Ngoma road, Ngoma has the highest proportion of women with 52%. Ngoma has a population density of 287[27].

Bugesera
Proportion of women is 51.3%. The population density of Bugesera was estimated to be approximately 280 inhabitants/km[28].

Nyanza
Nyanza is the most densily-populated district with 482 inhabitants/km and the proportion of women is similar to the one of Bugesera, 51.3%[29].

In regards to the road construction and the improvement of the socioeconomic welfare of the population in general and that of women in particular, initiatives to be undertaken to improve the livelihoods are to benefit not only the entire population, but also women in particular provided their ratio among the existing population in the area crossed by the road. As per Nyanza-Ngoma road, a number of aspects will also be of paramount relevance for the empowerment of women and all residents in general and particularly the poor, by addressing their strategic needs such as access to socio-economic opportunities. This project will benefit women in many ways:
First, provided that women's population is around 4% higher than that of men and given that they are the most running businesses aside the road, the latter will benefit from the road rehabilitation in many ways. Second, one would expect that less skilled jobs are to be given to local population without forgetting women who currently are found in many jobs such as masonry, assistant masonry, carpentry etc. as a result of the gender promotion policy in Rwanda. In this way, a need to provide the training of women in construction to facilitate their employment along the road construction process and on the other hand, their training in entrepreneurship and trade skills useful for the creation and the management of small and medium trades. Third, as women in the region are mostly burdened by water and firewood daily fetching activities, the availability of boreholes with sane water will ease women's day-to-day activities. However, the demographic and health surveys (DHS 2000, 2005 and 2010) conducted in Rwanda clearly show that violence against women is not only due to insecurity situations: women, regardless of their social class, are still the main targets. This violence is also a reflection of the status of women in society and their status is lower than that of the man inside the household. In rural areas, the workload of women is still considerably great: collecting firewood, fetching water, preparing food, in charge of reproduction and child-rearing, then agricultural labor.
It is important to take into account gender issues because, despite new legislations that give men and women equal rights to land, succession and inheritance rights, women still face inequalities because of customary and cultural practices that are prejudicial to women. Women's rights exist, national legislation bearing progressively a significant number of more provisions that are favorable for women, but those rights will gradually be applied. It is very important to take into account gender issues in the context of the implementation of the compensation process.

[27] **Rwanda 4th Population and Housing Census, 2012(NISR)**
[28] **Rwanda 4th Population and Housing Census, 2012(NISR)**
[29] **Rwanda 4th Population and Housing Census, 2012(NISR)**

5. Analysis of Project Alternatives

5.1 Analysis of project alternatives

The consideration of alternatives is one of the more proactive sides of environmental assessment, enhancing the project design through examining alternatives instead of only focusing on reducing adverse impacts of a single design. This calls for the comparison of feasible alternatives for the proposed project site, technology, and/or operational alternatives. Alternatives may be compared in terms of their potential environmental impacts, capital and recurrent costs, suitability under local conditions, and acceptability by neighbouring land users.

5.1.1 Design alternative

SPEA Engineering, the consultant who did the conceptual design, identified the following potential design optimizations:

1. Remove the additional no. 2 lanes (one per direction) from the typical cross sections designed for the major towns and small town/village, ref. T4 and T5 respectively. The new sections proposed by the Consultant are shown in the following:

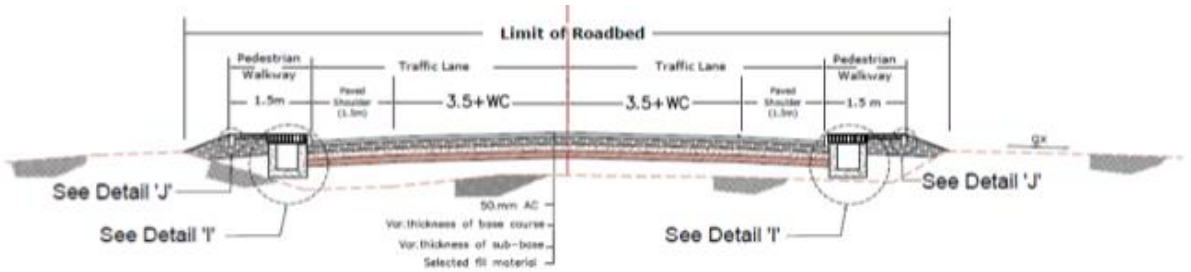

Figure 5-1: Divide two lanes for small town/village

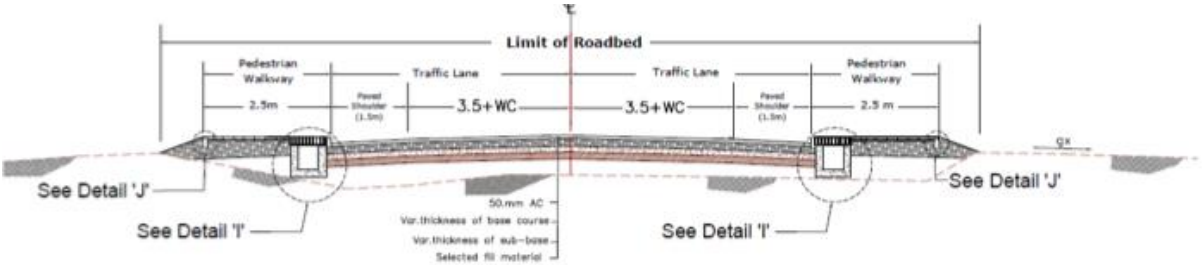

Figure 5-2: Divide two lanes for major town

2. Improve the Road Safety Condition by ensuring pedestrian walkways along all the urban sections (major or small contexts) and proper shoulder width for bicycle users.

3. Include a proper number of Bus Bays along the road sections crossing the major towns. Indeed, the small buses and motorbike taxi currently stop within the lane width by forcing the other vehicles to overtake them occupying the lane in the other direction. The following figure shows a basic layout suggested by the Consultant at this purpose.

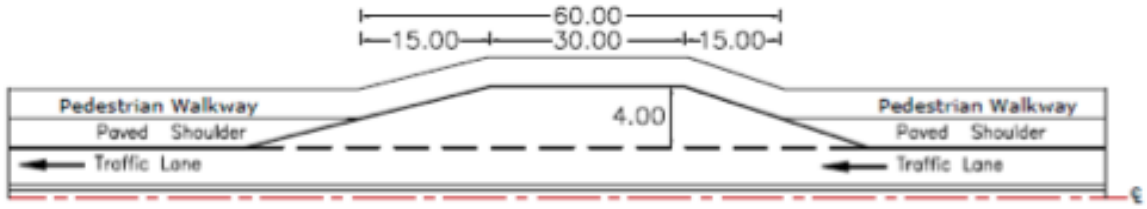

Figure 5-3: Pedestrian walkway

3. Last but not least, the use of opening gutters (Design Detail "G" of Typical Cross Sections) along rural cut sections potentially contributes to the loss of vehicle control due to one (or more) wheel fallen down the drainage elements. For this reason, SPEA recommends the use of carriageable iron grids or similar concrete elements.

Alignment

The geometric and alignment design has been carried out in accordance with approved practice and use of relevant design manuals, speeds and other specifications. The design engineer and the project economist have taken due exception to provide an economic and safe design that is also in line with projected budgetary allocation.

The best alternative selected is to keep the same alignment, remove the additional no. 2 lanes (one per direction) from the typical cross sections designed for the major towns and small town/village, ensure pedestrian walkways, include a proper number of Bus Bays along the road sections crossing the major towns and upgrade the existing road.

5.1.2 Project sitting

The objective of the road project is to upgrade the existing Ngoma-Nyanza road to bitumen standard so as to open up the area for economic development. The road crosses three different natural habitats Gako military domain, Akanyaru wetlands and Akagera. We are not here talking about a new road; it is an existing road that will be upgraded to bitumen standards with only 15meters of width. The project will still cross wetlands in some areas as per the table 7.3 Mitigation measures and strict monitoring of impacts are recommended to protect ecological functions of these two wetlands and Gako military domain. Change of sitting to avoid impact on natural habitat is not the best alternative. The best is to apply strict mitigation measures to protect these natural habitats as proposed in the ESMP.

The proposed alignment has no critical sharp corners that require a specific realignment.

Analysing the proposed alignment and impacts that it may have on natural habitats, specifically Gako military domain, no realignment should be considered. In addition, sticking to the existing alignment reduces the impact on loss of land and assets.

During the site visit the consultant noted that the renovation of the two major bridges (Akagera and Akagnaru, recently collapsed) have been already appointed to a Chinese contractor under a DB contract. This could generate a potential misalignment among the highway design and the new bridges. It is proposed the two engineers working on the highway and bridges consult to harmonize the design of the two main road components.

5.1.3 Construction techniques

Construction techniques mainly involve either use of heavy machinery, labor-intensive methods or a mix of both through engaging the services of a competent roads contractor. The decision on the method of construction is almost entirely made by the contractor who is contracted through competitive bidding. But the best alternative would be a combining the heavy machinery and labor intensive to meet the timeline while maximizing the prositive socio-economic empacts of the project.

5.2 Analysis of project options

5.2.1 Analysis of zero scenario and the proposed project options

Analysis of the various options in terms of their technical, economic, environment and social feasibility were considered. However, since the Ngoma-Nyanza earth road exists and there is no new road corridor, which will be designed, there were two options that were considered. They are:

a) Zero option / Do nothing option;
b) Reconstructing /Rehabilitating the entire proposed Ngoma-Nyanza road

a) The Do nothing option

The following positive impact is anticipated:

- There will not be activities that cause resettlement of the local communities living or utilizing the land for different reasons in the selected project area;
- No temporarily disruption to access to homes and basic infrastructures will occur
- No risk of social conflicts due to influx of workers, including increase of STDs and HIV/AIDs as no permanent workers will be staying in the different planned worker camps

The following negative impacts are anticipated:

- Continued delays may be experienced in Southern Province because the trucks transporting goods from Tanzania will continue to use Rusumo-Kigali-Nyanza road.
- High maintenance and fuels costs for motorists using the existing roads in poor condition;
- Loss of potential employment opportunities for communities near to alignment

The first option will not achieve the objective of the project since time and cost of transportation will continue to be high, transport services, increase agricultural productivity and marketing capacities will still be hindered by poor Ngoma-Nyanza road conditions. Accidents along the dilapidated earth road will continue to occur, with a possibility of an increase of the number of injuries and fatalities due to the continued worsening condition of the road, slow traffic flow will not improve and therefore slow transportation of goods between Eastern Province and Southern Province, loss of economic time, productivity will continue and severely hinder access to social services, in particular health care. This is not a desirable alternative.

b) Reconstructing /Rehabilitating the entire proposed Ngoma-Nyanza road

The implementation of the project will have the following positive impacts:

- This alternative will reduce the travel times, from Ngoma City and residential settlements around the road, to and from Nyanza District.
- Reduced maintenance and fuel costs associated with better quality roads,
- Job opportunities will be created during construction phase as well as the post construction phase. It will give local residents the prospect of earning income to better sustain their families.
- Improve travelling conditions during commute.
- Stimulation of ancillary sector (tourism, trade, education, health, etc)

The following negative impacts are possible:

- Destruction of habitats especially in construction sourcing areas and roads widening areas is due to extensive clearing, cutting and filling operations required during constructions,
- Relocation of residents whose properties fall within the alignment and associated project limits
- Potential for social conflict with influx of workers during construction.
- Possible water pollution due to excavation and construction activities in close proximity of the rivers.

The prevailing condition of the Ngoma-Nyanza road network and the need to asphalted road were duly considered during the development of design. Some road sections are currently dilapidated and rutted earth road network in poor condition. Implementation of the proposed Ngoma-Nyanza road project will therefore be the desirable alternative, and is expected to improve traffic flow, consequently lowering vehicle operating costs, improving transportation of goods, and people and reducing time and cost of transportation. Road safety is also expected to improve along Ngoma- Nyanza road network. This is obviously the best option compared to the zero scenario.

5.2.2 The proposed Ngoma-Nyanza road construction option

The evaluation of interventions to improve the road has been guided by the following criteria:

- Connection to Eastern and Southern Province
- Reduction of transportation cost and transportation time for goods and passengers.
- Increase of the road network efficiency through the road widening and asphalting.
- Road improvements while achieving their specific objectives contribute also to the improvement of the overall performance of the road network in both technical and socioeconomic terms.
- Road improvements aimed at improving the road condition.
- Road design targeting a maintainable standard the participation of local communities.

Figure 5-4: Pronounced rutting, loss of camber and lack of side drainage system

6. Public Consultations and Opinions Expressed

6.1 Introduction

Project stakeholder consultation is a vital component of the EIA process. The consultation process focuses on providing information on the proposed project in a manner that can be understood and interpreted by the relevant audience, seeking comment on key issues and concerns, sourcing accurate information, identifying potential impacts and offering the opportunity for alternatives or objections to be raised by the potentially affected parties; nongovernmental organizations, members of the public and other stakeholders. Consultation has also been found to develop a sense of stakeholder ownership of the project and the realization that their concerns are taken seriously, and that the issues they raise, if relevant, will be addressed in the ESIA process and will be considered during project design refinement.

Consultation with all project stakeholders began during the Scoping phase and continued throughout the entire ESIA process and will continue during the Ngoma-Nyanza reconstruction and operational phases. Six meetings took place in all the three Districts; an introduction meeting with the Vice Mayors and other relevant officers and a consultation meeting with the residents from the communities living in the project area, local institutions, community based organisations and other opinion leaders.

A wide consultative meeting was organized at each district office and grouped the identified relevant stakeholders as listed below.

- Local populations affected or interested by the project
- RTDA
- REMA
- Districts local authorities
- Water and Sanitation Corporation (WASAC)
- Rwanda National Police (RNP)
- Leaders at sector, cell and village levels
- Youth and women committees
- Opinion leaders
- Religious communities
- Community members and farmers expected to be affected by the project

A Stakeholder Engagement Plan (SEP) has been prepared to record the methodology and outcomes of both the ESIA and wider project stakeholder engagement process. It will also set out proposals for future stakeholder engagement and participatory methods for communication and feedback.

A SEP has also been developed alongside this updated ESIA to ensure effective stakeholder engagement and consultation through all Project lifecycle stages. It includes:

- An overview of the stakeholder engagement activities and consultations that have already taken place
- Identification of key stakeholders
- The principles of consultation and disclosure that will be adopted
- A future stakeholder engagement programme
- Roles and responsibilities to effectively manage stakeholder engagement
- A grievance mechanism
- The SEP will be periodically reviewed and updated during project implementation.

Stakeholders identification was based on classification of stakeholders in the three main groups: Primary stakeholders, secondary stakeholders and tertiary stakeholders.

- Primary stakeholders are those to be directly affected positively or negatively (populations to be dispaced, vulnerable groups, polpulations to be employed,..etc), secondary stakeholders are those not directly affected by the project but involved in the project implmentation process (RTDA, REMA, Districts, Ministries, REG, WASAC, Rwanda National Police (RNP), Leaders at sector, cell and village levels, youth and women committees, opinion leaders, religious communities..etc) and the tertiary are those not affected or involved in implementation but involved in one way or the other such as decision making process. Tertiary stakeholders include the financial institutions financing the project (World Bank, JICA).

Details on their roles and responsibilities are provided in sections 8.2 pages and 2.4

6.2 Approach and methodology

The method adopted for public consultations was open discussions with the relevant local institutions at district level, sector, and community based organizations and residents from communities living in the project area.

6.3 District and Sector Level Consultations

District level consultations were held with all sectors representatives present. The project and relevant projects components were introduced to Mayors and Vice-Mayors and to relevant officers (land, environment, agriculture, social affairs) and all sector Executive Secretaries. The District Authorities were informed about the project as they will contribute in implementation of some mitigation measures like resettlement and private land acquisition. So far, there is little information on the projects in the local population. Both District and Sector staffs were very interested in details on the size, location, start and due dates for completion of the work, etc.
Generally the interest in the project is big and positive; the population sees the possibility of increasing economic activities in the area with the reliable transport facilities especially for small business creation and increased living standard.

As the impacts of the projects involve resettlement of some houses the task of district officers is manageable, however they need to be informed officially and provided with the proposed road design of the project and the affected areas in order to start informing inhabitants how the project will affect them and ask for their cooperation.

6.4 Consultation with local representatives

Public consultations with potentially affected people were carried out.
Generally people appreciate the project, because they expect to gain reliable transport through the project and improve their living standard and economic opportunities. The negative impacts are considered minor. However, people have the right to be informed in advance and to receive just and timely compensation of lost assets.
Although a little information about the project was provided to local population, this consultation has ensured that people who may be affected by or have an interest in the proposed project have had an opportunity to express their opinions and concerns. Views have been sought at the local, regional and national levels.

6.5 Summary of anticipated negative and positive impacts

Participants to the meeting identified a number of environmental and social impacts both positive and negative to be issued by the activities of construction of the road.

6.5.1 Summary of anticipated positive impacts

a. Creation of employment to the local population;
b. Increased infrastructure;
c. Creation of income generating projects
d. Generally, Ngoma-Bugesera-Nyanza road is needed and will increase the trade in Rwanda and especially in the three Districts.

6.5.2 Summary of anticipated negative impacts

a. Noise and vibration by construction machinery
b. Land and crops losses
c. Cutting of the trees; especially in Bugesera District which is a dry land
d. Risk of accidents from the project related works and by construction machinery
e. Damage of people's properties
f. The road construction works may also lead to increases cases of sexually transmitted due to influx of workmen who are associated with irresponsible behaviors.
g. Increased soil erosion due to excavation works along the road alignment as well as improper drainage of runoff from the road to lower catchment areas.

This is likely to be of high magnitude in the steep areas.

6.6 Detailed issues rose during consultation meetings at the 3 districls level

The tables below points up a number of issues/questions rose during public consultation meetings in the three Districts. As much as stakeholders appreciated the Project, they expressed concern on a number of issues associated with the Project. Some of the issues raised and discussed included the following in the tables below:

Table 6-1: Issues raised and discussed during consultation (Bugesera District)

Bugesera District **09/08/2016 11h00 - 12h30 Bugesera District Office**	
1. The participants inquired about the starting time of the project since the PAPs are not allowed to use their land for any long-term project and the starting time for the valuation census exercise.	Adequate notice will be given to the PAPs and the local leaders shall inform the population.
2. The participants also expressed their concern about the properties, which will be, damaged during the road upgrading works and yet they are not subject to expropriation.	Mr. Celestin Hakorimana, RTDA envoy recalled that public consultation meetings are to collect from stakeholders their views and concerns, but more so to come up with appropriate measures to mitigate negative impacts and enhance the positive impacts; and prevent, reduce and or mitigate the negative impacts.
3. It was asked to who it belongs the properties that are already expropriated	RTDA representative explained that they belong to the GoR but that negotiations can be made and the properties serve the community if needed. Selling the expropriated properties is not allowed, he said.
4. Once compensation is done by the government, do owners have any right to use the area nearby the road? That is to say the expropriated area but that can be used by the former owner of the property.	Yes, the notice with time limit will be served to all affected persons for the removal of necessary materials and other properties. As for after the expropriation exercise, where possible the land will be owned by the government but can be used by the former owner.
5. What will happen to graveyards especially those of genocide memorial sites that will be affected by the project?	RTDA and the districts will assess the case. The options in such situations include relocating the graveyard to a public graveyard. In addition, a chance find procedure will be utilized by the contractors to handle graves found during construction.

Table 6-2: Issues raised and discussed during consultation (Ngoma District)

Ngoma District **09/08/2016 15h00 - 17h30 Ngoma District Office**	
1. A. Didace Mulinzi asked if that meeting was the beginning of the project and if the people should start to prepare their relocation.	RTDA representative answered that the project has already started with the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) along the road corridor. However, people should continue to lead their normal lives, as adequate notice will be given to the

	project affected people.
2. Will the constructing company give jobs to the local population?	ED&P representative ensured to the participants that the local population is first priority to get jobs. It was suggested that where qualification is not required, those affected by the project be employed first.
3.A.Pierre Celestin Akingeneye needed to know the standards meters of a road and also raised his concerns on what the road will affect like the Rufunzo center, Paroisse Rukoma.	It was explained to him that the road is supposed to be widened to 7.5m each side which makes it 15m. It is a road-upgrading project to bitumen standard. Only 15meters are to be considered for expropriation.
4. The stakeholders observed that the construction activities would bring about disturbances of noise and destruction of some properties.	CSP Anselme Ahimana RNP Officer evoked that the project comes to facilitate mainly the public, the Rwandans. Therefore the rights and interests of the affected persons are of great concern to the government.
5. It was suggested that some deviations to some centres eg: In Ngoma District: -Gafunzo-Rukumberi centre should be considered to avoid road accidents caused by traffic; -Technical school in Karama cell in Kazu sector.	The engineers will take into consideration this concern if really these sharp corners have caused some accidents.

Table 6-3: Issues raised and discussed during consultation (Nyanza District)

Nyanza District	**11/08/2016 10h00 - 12h45 Muyira Sector**
1. What will happen to properties that are not subject to expropriation but will be damaged by project related work?	There will be a team "Engineer" in charge of the inquiries concerning any damaged property not subject to expropriation.
2. What can the project affected person do in case there is a delay in paying the expropriated properties?	As stipulated by the Law, the GoR makes sure that construction works start after expropriation issues are cleared and a mobile line of an RTDA staff in charge of expropriation was given to them by him.

3.Some deviations needs to be considered in Nyanza District: -In Butara, Gashara center might be affected -The school EAV Mayaga and Paroisse Nyamiyaga might be affected -Busoro College APADEM might be very near the road, which is a concern.	All the necessary deviations will be considered and all the possible options will be considered.
4. What can ensure the PAPs that this project will not disappoint us as the previous ones on valuing and paying affected properties is concerned?	The RTDA representative answered that the construction works will start after the PAPs will have been paid and ensured participants the affected people will be compensated at fair prices.
5. Participants raised the concerns of delays in paying the expropriated properties.	RTDA representatives assured that they will make sure all the population will have been paid before project construction works start.
6. The participants suggested that the local materials should be sourced from within the area.	Local people around the project will be involved as much as possible in the activities of the project.
7. The local leaders requested to always be updated on the progress and results of the project.	PAPs were promised to be updated as the project goes on. Regular meeting will be organized with the persons interested or affected by the project.

Other issues /concerns similar in the three Districts were:

- District staff importantly noted that district budget is low and the projects are not included in the development plans of the district. This makes it difficult to allocate resources to support the implementation of project especially during resettlement and compensation. It should be evaluated if additional resources could be provided to support the district administration.
- District officers need to be given the proposed road design of the project.
- There should be adequate and timely compensation of the affected people who will be required to relocate to pave way for the road. The affected persons should be compensated before construction begins.
- The contractor should make use of locally available resources such as casual labourers, construction materials as well as rented vehicles.
- The contractor should work closely with the local communities and local administration,

- The Contractor should find technical solutions where possible for preserving the available water facilities and sources especially the ones found very closed to the road.
- The Contractor should preserve and/or improve accesses to any available feeder roads.
- Cutting down of trees should be avoided as much as possible to avoid destruction of indigenous trees as well as habitats**.** The Contractor should also plant trees after construction works.
- The communities expressed concerns on the possibility of destruction or damaging of their crops during construction phase. This should be kept to a minimum.



Plate 8. 1: Participants during public consultations in Nyanza, Ngoma and Bugesera Districts

The PAPs seemed to share a number of issues/ problems with other stakeholders, as it is demonstrated in the above table.

6.7 Suggestions

Stakeholder's recommendations to participants:

- It was requested to local leaders to ensure their people fulfill the requirements (including the registration of their land properties in due time) for the compensation process to be effective and efficient and to not provide land properties to the people still building in the way leave of the road.
- Local leaders should be involved at all stages of project as far as the population properties are concerned to the extent that they follow up until they help the population on how to profitably utilize the money they get from compensation.

- Local leaders should report on time any inconvenience that requires RTDA intervention
- Local leaders were requested to help the youth to profitably utilize the electrical energy by starting small businesses
- Women should get involved in all the economic activities meant to develop the area and the country as a whole
- Local leaders should help in controlling and preventing the population from doing long-term projects in the identified roadway leave.

Local leaders' recommendations to concerned organs

- They wished that all that will be damaged by access road should be counted, priced and paid for.
- Participants suggested that the government should oblige the contractors of the project to give jobs to the local population.
- There should be organized campaigns about roads and sexual awareness.
- It was also suggested that there should be a special case in the East (Ngoma and Bugesera) where when constructing the road, they leave space for the Bikes since this region is not hilly and use much this way of transport.
- It was suggested that the road match or blend in with the new bridge to be constructed. Eg: Rwabusororo Bridge in Nyanza District

Outcomes of the consultative meetings

The concerns and wishes raised during the consultation meetings were well noted and will be taken into consideration.

The community members and local leaders embraced the proposed project as it was agreed it would bring a lot of positive impacts. Stakeholders, however, urged the project-affected persons not to start new construction projects in anticipation for added compensation as this might lead to their loss if discovered or would increase the budget for compensation whereas such money can be used for other developmental activities.

The participants have however proposed adequate mitigation measures to make sure that negative impacts resulted from the project are addressed through an adequate Environmental Management Plan and a Monitoring Framework.

The participants insured the ED&P, RTDA, RNP and WASAC team that the road project and its related works will increase their social and economic development by creating new small income generating projects and trade between the three Districts and neighboring countries.

7. Potential Impacts and Mitigation Measures

7.1 Introduction

This section outlines the potential negative and positive impacts that will be associated with the proposed rehabilitation/construction for Ngoma – Nyanza road project. These impacts were considered for the various phases of the project, as they will be related to activities carried out:

- Design and planning phase
- During construction of the road;
- During operation when the road will be used for transportation;

- Decommissioning of the facilities such as construction camps, equipment and materials used for the construction and maintenance of the road when it will be in operation.

The impacts of the project during each of its life cycle's stage can be categorized into: impacts on the biophysical environment and socio-economic environment. For ease of reference, the impacts due to or affecting certain elements during each phase are presented in a narrative form and summarized in a tabular form at the end of the each subsection as well as related mitigation measures. An environmental checklist was elaborated to check whether all project environmental and social issues were addressed through this assessment (annexure 1).

7.2 Negative environmental and social economic impacts identification

The proposed road reconstruction project will have several beneficial impacts on socioeconomic and biophysical environment.

However, there will be also some adverse impacts on both socio economic and biophysical environment of the area.

The proposed improvement work in the road corridor will be primarily confined to public land i.e. the existing Right Of Way (ROW).

But, widening of the road requires widening of the existing ROW (approximately 4m) to 7 m in most parts. This will lead to expropriation of land and other assets and utilities (transmission line, water), trees, common property resources and individually owned assets from the current owners/users. This will also cause disruption of existing environment and social set up and direct economic loss for asset losers and their families in the process. In addition, the project may impact the existing environmental and social conditions during its operation i.e. after its full stages of development.

To identify such impacts, attempts have been made to record the perceptions of community about the negative impacts of the project, through roadside interviews and community consultations at few stretches. The major adverse impacts as identified during such discussions include:

- Loss of agricultural, residential and business properties.
- Loss of trees, green tunnels and other natural resources
- Loss of common property resources i.e. tube wells, dug wells, drinking water tap points, tanks etc.
- Loss of infrastructure facilities,
- High risk for pedestrians and slow moving traffic, and
- Increase in pollution.

This section deals with the identified negative impacts in different phases of the proposed Ngoma-Nyanza road project.

The general impacts anticipated during the construction and operation phases between the project activities and environmental components are summarized in the matrix.

Receptor / Activity	Atmosphere	Surface waters	Groundwater	Soil	Geology	Landscape	Archaeology	Flora and Fauna	River ecology	Shipping	Land use	Local population	Local employment	Utilities	Community infrastructure	Transport	Economics
Planning and design phase																	
Resettlement											■	■		■	■		■
Private land acquisition											■	■			■		■
Crop and other assets damages											■	■			■		■
Construction phase																	
Workforce mobilization												■	■		■	■	■
Ground clearing and grading	■	■					■					■	■				
Modification of existing service	■										■	■	■			■	■
Excavation of drainage	■		■	■		■	■				■	■	■				
Construction site facilities, services, utilities	■											■	■	■			
Operation/ maintenance phase																	
Life condition improvement													+	+	+	+	+
Reduction of erosion rate						+			+		+						
Improved road facility												+	+	+	+	+	+

Table 7-1: General Impact matrix of the project

The general negative impacts anticipated during the construction and operation phases are summarized in the following flow chart.

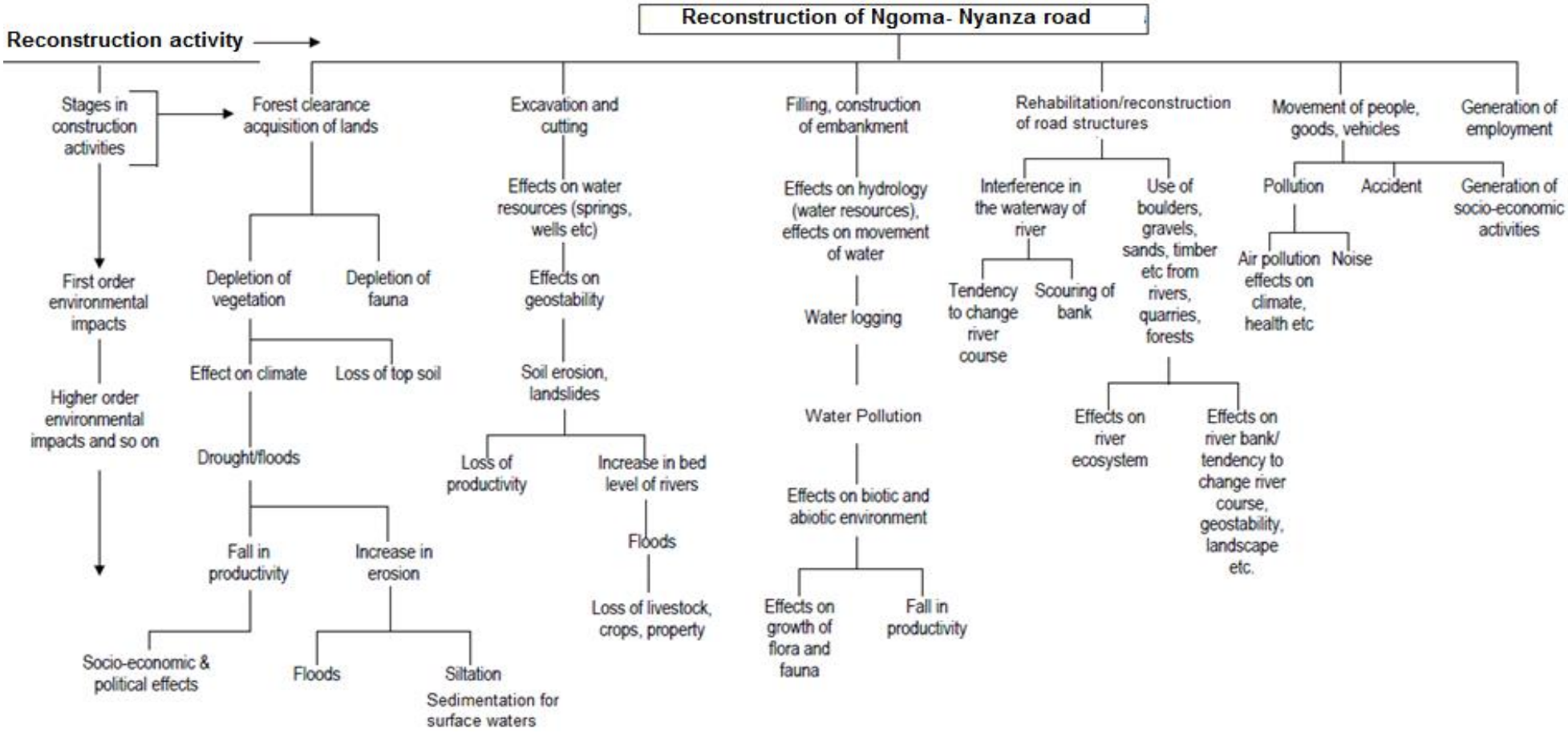

Figure 7-1: Comprehensive flow chart showing environmental and social impacts caused by Ngoma – Nyanza road upgrading

7.3 Project impacts during planning and design phase

7.3.1 Loss of land and assets (including crops)

The proposed Ngoma-Nyaza road construction and widening project will have adverse impacts in terms of activities that will trigger off resettlement of the local communities living or utilizing the land for different reasons in the selected project area. This is because the project upgrading activities will lead to acquisition of the land in the road reserve area that was not supposed to be owned by individual farmers. Therefore, the implementation of the project will require economical displacement of some of the households living in the surroundings of the road or utilizing the land for economic purposes.
The road alignment on the 130km has been optimized to avoid physical displacement.

Plate 6. 1: Grass and trees to be cleared during road upgrading activities

People affected by the project are subdivided into two main categories.
Findings revealed that up to 312 households subdivided in 2 lots, namely lot 1 with 429 PAPs, lot 2 with 1537 PAPs, will be physically dispaced. In addition, 586 households will be economically dispaced and partially affected by losing crops, trees, land and part of premises without necessarily having to be displaced to give way for the implementation of the proposed road upgrading project. Also, 11 social structures which include 4 schools, 2 churches, 4 hospitals and 1 market which will be temporaly affected economicaly.
Aside from positive impact, the table below summarizes the negative socioeconomic effect of the project along its right of way.

Table 7-2: Assessed impact of the project implementation in Ngoma, Bugesera and Nyanza area

Item	Unit
Affected District	Nyanza, Bugesera and Ngoma
Affected Sector	Bugesera, Busoro, Gashana, Gashanda, Gashora, Gatoki, Kamabuye, Kazo, Kibungo, Kigoma, Muyira, Ngeruka, Nyarugenge, Ruhuha, Rukumberi, Rurenge, Sake, Shanda
A) Losing houses and assets	
Houses – living quarters	312
Commercial premises/ formal and informal	254
Churches	**2**
Schools	4
Health center	**4**
Market	1
Tree or crop	50,545
B) Land	
Households loosing lands or partial effects	586

Source: RTDA, July 2016

The widening of the Nyanza Bugesera Ngoma road will affect PAPs located in 18 sectors thus losing either living quarters, commercial building, churches, schools, health centres, one market, trees, crops and land.

Table 7-3: Total number of PAPs to be physically displaced

LOT	District	Sector	HHS	Size_HH
Lot 1	Ngoma	Rukumberi	23	145
		Sake	13	82
		Gashanda	14	88
		Rurenge	5	32
		Kazo	3	19
		Kibungo	4	25
	Bugesera	Gashora	6	38
Sub-total			**68**	**429**
Lot 2	Bugesera	Nyarugenge	68	428
		Ruhuha	12	76
		Ngeruka	8	50
		Kamabuye	16	101
		Mayange	4	25
	Nyanza	Kigoma	6	38
		Muyira	37	233
		Busoro	93	586
Sub-total			**244**	**1537**
Total			**312**	**1966**

The table below summarizes the estimated cost for each category of the above-mentioned structures, in reference to actual value recently provided by districts' valuers and the current market value in respective districts.

Table 7-4: Compensation costs by categories of assets

Categories of assets	Quantity	Amount /RWF	Amount /$
Land covered by trees	187,620m2	129,270,180	152,083
Residential structures partially affected	258	1,289,880,744	1,517,507
Residential structures fully affected	312	4,155,553,100	4,888,887
Social structures	11	194,000,000	228,235.3
Business structures partially affected	9	30,000,000	35,294
Crops and trees	10547	733,128,600	862,504
Other RAP Implementation cost	NA	149,500,000	175,882
Sub-Total		6,681,332,624	7,860,392
Contingencies	5%	334,066,631	393,020
Grand Total		7,015,399,255	8,253,412

Primary data, RTDA, Ecodesign, July 2016

Area	Environmental element	Impact	Criteria	Assessment
Loss of land and assets	Resettlement and change in land use	Land use and displacement	Nature	Negative
			Component value	Medium
			Intensity	Strong
			Extent	Local
			Duration	Permanent
			Importance impact	Medium

Mitigation measures

- *Those affected will be compensated according to the official compensation rates.*
- *The acquisition of the land and private properties will be carried out in accordance with Rwanda Expropriation law for public interests, World Bank OP 4.12, RAP and entitlement framework for the project.*
- *Early identification of entitlement for compensation planning of Resettlement and Rehabilitation Action Plan to compensate the losses.*
- *A standalone Resettlement Action Plan must be designed to document how project will minimize the displacement and provide IDPs assistance before, during and after physical and economical relocation. It should aim at improving the living conditions, the ability to earn a living and the level of production of the displaced. It must be designed and implemented as part of a development program.*
- *In addition, displaced populations must be adequately consulted at an early stage of the planning process and be encouraged to participate in this and in the implementation of the*

resettlement program. In this regard, special attention should be given to the location of the resettlement site and scheduling of activities. For either access useful information about the proposed project and the resettlement and rehabilitation plans must be provided on time and in an appropriate and understandable by local people in the past and organizations to national civil society. Similarly, meetings should be organized meticulously.

- *Displaced persons should be compensated before their actual moving and start of construction activities.*
- *The population resettlement plan is carried out in consultation with the population itself, the services of the districts and the Ministry of Local Government.*
- *Compensation for expropriated population will be in accordance with the Land Law No. 43/2013 of 16/06/2015 and the expropriation law (32/2015 of 11/06/2015. The assessment of the values of the expropriated property (buildings, trees, crops, businesses) should be based on a market values in the three different districts; Ngoma, Bugesera and Ngoma.*
- *All the affected people will be compensated as per regulation before commencement of Construction works*
- *Restoration of land after road construction must be done.*
- *Covering the side drains with concrete blocs and use these blocks as pathways and buffer area between the road and surroundings can reduce the number of houses to be demolished, located next to the road and constructed at more than 7 meters from the edge of the road*
- *The design will minimize the land to be acquired temporary or permamently. Construction activities will be confined on the strcict minimum of land required. Barriers are recommended to show the boundary of construction activities especially on areas closed to the three critical habitats.*

7.3.2 Crops damages and trees cutting

Impacts on agriculturally used areas are one of the most important impacts of the planned road reconstruction project. Ngoma-Nyanza road ROW and extension of access tracks will traverse fields, as 80% of all areas in the project regions are cultivated by locals. Some Cash crops like coffee and banana, maize and bean for subsistence and commercial use is carried out in the road reserve. Since substantial quantities of road construction materials (sand, gravels and laterite) will be required for construction, some agriculture crops at the borrow pit and quarry sites will be negatively affected several ways crop clearing, poor visual quality and opening of depressions on the surface leading to destruction of agricultural crops. Any crops alongside the road will be cleared during road widening and construction works.

Inappropriate rehabilitation and reconstruction of drainage structures, disposal of excavated soil in natural storm water drainage system or lack of drainage structures will lead to erosion, sediments deposits or flooding of farms. The drainage structures may be constructed and directed to one point thus leading to destruction of crops or even flooding the whole area during rainy seasons.

Area	Environmental element	Impact	Criteria	Assessment
Crops damages and tree cutting	Clearing of vegetation and trees	Green clearing	Nature	Negative
			Component value	Strong
			Intensity	Medium
			Extent	Local
			Duration	Temporary

Area	Environmental element	Impact	Criteria	Assessment
			Importance impact	Medium

Mitigation measures

- *The drains will be designed and constructed with several outlets so that minimum volume of runoff are directed to the farms so as to reduce water logging or alternatively they should be directed to water bodies.*
- *Only trees planted in the road reserve must be cut. All other trees should not be touched whatever the need*
- *Trees cleared must be replanted elsewhere to improve the green of the site and its environment*

7.3.3 Gender aspects

Women will be more impacted by the projects than men as women are usually responsible for Some water supply and electricity infrastructures related tasks and the construction will affect water supply system. It will be important to repair the drinking water supply in the villages near the project sites in order to create tangible benefits for the local population. This drinking water supply projects will be relocated and improved as compensation / livelihood enhancement measures.

Women may not access to the payment related to compensation and households headed by women are more vulnerable. Women may not benefit equally from employment as contractors tend most of the time to recruit men considering experience and physical capability.

Area	Environmental element	Impact	Criteria	Assessment
Gender aspects	Access to water supply, employment	Access to water and employment	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Equal payment to men and women needs to be assured. If compensation payment is paid to a bank account, both men and women need to have access to it.*
- *Households that are headed by women and that are particularly vulnerable need to get additional assistance.*
- *It must be ensured that women get employment in the project at the same level and with the same payment as men.*

7.4 Project impacts during construction and decomissioning phases

Potential environmental impacts associated with project site and construction works include: loss of land and assets, soil erosion and compaction, sedimentation of streams, contamination of soil and rivers and the wetlands, disruption of surface and sub-surface drainage patterns, changes to soil moisture and fertility, edge effect on plants adjacent to cleared areas, deposition of airborne road dust and airborne emissions from vehicles and construction equipment, accidental fires, loss and/or conversion of fish and wildlife habitat, proliferation of invasive plants, disturbance to heritage resources, salvage and disposal of timber, noise and aesthetics.

7.4.1 Impact on income, livelihood and employment

As mentioned in planning documents, the country has a Poverty Reduction Strategy (PRS), which aims to reduce the rate of population living below the 60% poverty line to 25% and increase the income per person of $ 250 $ 900 at least, by the year 2020. It has set up a National Investment Strategy and the "Local Development Programme- High labor intensity" PDL- LI. This allows contributing to poverty reduction through the implementation of job-creating investment and income using local resources and strengthening the capacity of decentralized structures and local operators.

Practically, the only positive impacts of the construction and decommissioning phases are socio-economic: creation of direct and indirect jobs, increased trade within the project area and adjacent areas (Right of way is a site attractive for small shops and services), absorption of a number of unemployed among the local population, etc.

A big part of the work is usually performed by local or regional companies (supplies and supply of materials, etc.). The most complicated work is the responsibility of specialized companies, sometimes requiring the use of international expertise.

A site team consists of staff supervision and enforcement personnel. The latter, formed mostly of unskilled labor should be recruited locally up to 80%.

In general, the 50 km road rehabilitation works require between 100 and 200 people. Thus, the rehabilitation of 130 km of the Ngoma-Nyanza road will require 400 to 800 people per year, including 400 to 600 local workers.

Area	Environmental element	Impact	Criteria	Assessment
Income, livelihood and Employment	People in villages and hills crossed by the road	Hiring workers on site	Nature	Positive
			Component value	Strong
			Intensity	Medium
			Extent	Local or regional
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Preference for casual labourers should be given to local people but the local councils officials and local leaderships along the road corridor should be involved in recruitment processes.*
- *RTDA can make it a contractual obligation for the road contractor to hire a specific percentage of women.*
- *RTDA can make it a contractual obligation for the road contractor not to hire children for any work to be performed within the campsite or on the site.*

7.4.2 Socio Economic Improvement of Ngoma- Nyanza Road Influence Zone

The reconstructed and asphalted Ngoma-Nyanza road will improve the Social and Economic status of the influence area by opening up the area to the market for available goods and services. The project will also lead to spurring economic and social development by providing vital links between trading centres and enhance people's access to employment, and a wide range of social services including health centres, education, administrative headquarters and others. It will facilitate the connection to the proposed International Airport to be constructed in Bugesera District. Other benefits to the community shall include: employment and income opportunities, improved delivery of goods and services, efficient public transport, and easy access to the area. By opening up markets, the asphalted road shall precipitate increased production of agriculture rice, maize and other farming projects in the reclaimed marshlands around Akagera River. The asphalted road will stimulate the improvement of quality of life for residents of its influence zone.

The road project facilitates poverty alleviation, increase food supply and security. The development shall enhance equity and balance by facilitating the flow of goods and services from the surplus zones to deficit ones and thereby enhancing equitable distribution which will in effect reduce, stabilize and level the prices of goods and services. The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders.

Generally, temporary impacts having no obvious long-term consequences and are regarded as being minor. But those with long-term repercussions are classified as significant. Significant positive impacts are usually associated with improved access, which forms the prime objective of the Ngoma-Nyanza road project.

Ngoma-Nyanza road rehabilitation/reconstruction project comprises the widening and asphalting of existing road sections; no realignments are proposed, and any improvements of horizontal alignment to improve curvature and sight distance will be accommodated within the road reserve. Thus, the direct impact on land use will be negligible, and the requirements for land acquisition are minimal, apart from those for widening the road, and the establishment of the quarries and borrow pits.

Area	Environmental element	Impact	Criteria	Assessment
Socio-economy of the zone of influence	Social and economic status	Socio-economic improvement	Nature	Positive
			Component value	Strong
			Intensity	Medium
			Extent	Local or regional
			Duration	Temporary
			Importance impact	Medium

7.4.3 Impact on vulnerable groups

The project will contribute to the increase in household incomes and improve life conditions while facilitating financial participation in family and community development. We note that this impact will be positive, indirect, durable and of great importance. However vulnerable groups that include women may not benefit from this contribution.

Area	Environmental element	Impact	Criteria	Assessment

Women and vulnerable groups	Living conditions of women	Improvement of women living conditions	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Temporary

Mitigation measures

- *Income increase of women and vulnerable community members in the environmental restoration activities, commerce and crafts during the work.*
- *During construction activities, possibility for women and vulnerable community members to gain opportunities (road maintenance)*
- *Consider involving vulnerable groups through different project phases with different activities (tree nurseries, cleaning, security, road safety, campaign,.. etc*

7.4.4 Impact on safety in the project area

During its upgrading activities, the road will provide safety to the populations driving or walking on or in the surroundings of the right of way. The current road doesn't have shoulders. The proposed 2m shoulders in urban areas and 1.5 m shoulders in rural areas on both sides of the road will increase safety along the road.

Interventions through the road project will provide cleared and well-designed drainage outfall at appropriate locations to not only clear the road reserve, but also ensure nil or minimal interference with downstream social, economic and even ecological features. Through appropriate cooperation of the landowners and operators, this intervention will have direct and indirect benefits in the area. To the extent possible, landowners and operators on both sides of the road will be encouraged to ensure no pollutants enters the open drainage system. Among the potential pollutants to focus on, will include fuel service stations, workshops and motor garage yards. With the stoppage of roadside parking of trucks and other vehicles, a significant pollution loading into the open drainage will also be reduced.

Area	Environmental element	Impact	Criteria	Assessment
Air	Safety in the project area	Improved safety along the site	Nature	Positive
			Component value	Strong
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Particular attention has been given in project design to put in place measures that would enhance road safety like: provision of sealed shoulders, bus bays in settlements, improved road signs and markings and speed humps.*
- *The contractor will implement traffic management at construction sites to enhance traffic flow and safety and public road safety awareness activities along roadside communities.*
- *Proper traffic signs shall be placed at all necessary sites in the construction area to reduce traffic congestion and safety problem associated with haulage of materials and the construction works.*
- *Fencing of the worker camps is recommended*

- *Regular communication between the developer/contractor and the populations directed interested of affected by the project*
- *Set up a grievance mechanism*

7.4.5 Erosion and pollution

As mentioned earlier, the rocks of the project are of Precambrian age and belong to lower Rwanda. The folded sediments, consisting of the successive layers of pelitic rocks, especially of phyllite and the argillaceous schist, arenaceous rocks like the quartzose and quartzite, dominate the geological nature of this area. 77% of peat reserves are near Akanyaru and Nyabarongo rivers and the Rwabusoro plains. This peat soil can impact the surroundings following project activities.

Soil erosion will be very fast in this project area when it is exposed. The phenomenon intensifies and grows following the intense and heavy rains affecting the region during the rainy season.

Furthermore, storage of some materials such as hydrocarbons used for vehicles and operation of equipment/machines represents a second source of pollution for the environment. Indeed, stored in unmanaged areas (without shelter against the storm water runoff or non-sealed soils), these products can contaminate soil.

In addition, some operations such as uncontrolled drain gear of the site, off the paved areas and especially equipped and the supply of fuel in vehicles under conditions not to prevent or contain accidental leaks and spills these hydrocarbons generate a significant adverse impact on the soil.

Area	Environmental element	Impact	Criteria	Assessment
Soils	Structure of soils	Degradation by settlement	Nature	Negative
			Component value	Medium
			Intensity	Low
			Extent	Punctual
			Duration	Temporary
			Importance impact	Low
	Redesign of profile in the borrow areas	Perturbation of initial profile	Nature	Negative
			Component value	Medium
			Intensity	Strong
			Extent	Punctual
			Duration	Permanent
			Importance impact	Medium
	Campsite	Pollution of the soils by hydrocarbons and solid and liquid wastes	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Punctual
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Natural drainage shall be maintained. Measures will be taken to maintain normal flows as well as prevent erosion and pounding.*
- *Wherever possible, drainage water from construction areas shall be diverted through vegetated*

areas prior to entering a water body.

- *If necessary to prevent erosion, ditches will be stabilized with bioengineering methods involving vegetation, erosion control blankets or granular materials.*
- *Run-off shall be diverted away from erosion susceptible slopes to prevent further site degradation.*
- *Sedimentation control shall be provided in sloped work areas and work areas adjacent to water bodies. Acceptable methods of sedimentation control include: straw mulching and seeding; erosion control blanket and seeding; logs, planks, retaining walls etc.*
- *Wastewater resulting from washing vehicles or equipment shall not be discharged directly into waterways. Vehicles and equipment shall be cleaned at a location dedicated for that purpose.*
- *Surplus excavated soil shall not be stockpiled near wetlands or adjacent to streams. Surplus soil shall be removed to an approved disposal area.*
- *Oil, fuel, lubricant spillage can be avoided with due care during maintenance activities. In some cases biological dispersants can be used to break up oil particles*
- *Install grease traps for surface run-off in market centers*
- *Improved disposal of solid wastes along the road alignment so that they don't find their way into the river.*
- *Control the development of un-planned settlements and kiosks along the road and river line*
- *Local authorities and bus companies should provide dustbins at convenient positions.*

7.4.6 Impact on Vegetation

Vegetation should not be cleared unnecessarily during the construction works, whether for widening of the road carriageway, or for the clearing of laterite and gravels and associated access roads. This should be specified in the Contractor's contract.

Loss of vegetation in this phase is caused by activities related to clearing of sites for installation of works, preparation of stockpile area, access roads and park sites and the demand for fuelwood by labour force.

Along the whole road, trees should be planted along the edge of the road reserve after completion of the roadwork. This would augment the aesthetics of the settlements/ towns, and would also help to prevent soil erosion along the roadside.

Planting of trees, shrubs, and grassing must be specified in the standard Specification, and as an item in the Bill of Quantities.

Dust pollution from gravel access roads by haulage trucks during the transportation of laterite, stone aggregate, cement, petroleum products and other chemicals including emissions from crusher and vehicles hamper normal growth of roadside vegetation. Similarly poor disposal of toxic waste and petroleum products hampers normal growth of vegetation.

The road crosses three different natural habitats; Akagera wetlands, Akanyaru wetlands and Gako military domain. The plan is to widen Ngoma-Nyanza road to 15meters of width that include the carriageway, shoulders, side drains and pathways. The area crossed by Gako military domain is large enough to accommodate the project activities but the encroachment of the buffer zones of the two wetlands is not avoidable in some areas.

As earlier mentioned, some invasive species of shrubs were identified on the Gako military domain and there is a risk of dissemination of this weed along the project area.

Area	Environmental	Impact	Criteria	Assessment

	element			
Vegetation	Vegetation clearing	Loss of vegetation	Nature	Negative
			Component value	Strong
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Replantation of tree cut will be done along the feeder road side*
- *Compensation will be provided for private tree cut*
- *Supervision of reforestation should be appropriately done*
- *The contractor should ensure a minimum vegetation is cleared in the buffer zone and a structure should be erected to protect the wetland from contamination*
- *Regularly clear these invasive species and avoid dumping all king of waste along the road and in the Gako military domain area as this may increase the proliferation of these invasive species*
- *Restoration of habitats through restoring the buffer zones and planting indigenous trees (see annex 5)*

7.4.7 Hydrology and Drainage

The assessment of impacts to the existing hydrological regime as a result of the proposed works has been developed by way of secondary data review and also on the basis of experience of hydrological responses to similar works in a similarly dynamic system. Given the highly variable nature of the hydrological regime of the project area, predicting impacts with a high degree of certainty is difficult; however, the system's very dynamic nature indicates a robust environment, readily adaptable to change.

The following issues have been identified as the key factors requiring consideration in the context of hydrological impacts:

Backwater upstream and scour downstream of the proposed works

Flooding naturally occurs in the project area as annual floodwaters sheet across the expansive Akanyaru and Akagera Rivers floodplain but it does not move over the existing low-level earth road formation.

The proposed raised embankment, coupled with the construction of two new bridges, replacement of the two existing bridges structures (at Akagera and Akanyaru Rivers) and excavation of culverts and possible levees will alter the upstream backwater extent and redistribute water velocity in the immediate downstream extent, reducing flooding of the road profile.

Hydrological studies done suggest that there will be low alteration to the hydrological regime currently experienced in the survey area; however, the impacts appear manageable. Local residents are concerned that backwater upstream and scour downstream of the project area may intensify as a result of the proposed works, resulting in greater flooding downstream of the proposed road for extended periods of time. However, the magnitude of hydrological effect is

expected to be of low significance as the project is about the widening of existing road embankment.

Erosion and scouring

During and after construction, erosion and scouring could potentially contribute large amounts of sediment and silt to the river system, causing alteration to aquatic life. Scouring also has the potential to cause weed spread and create access issues for local communities.

The following section addresses these key issues and describes the predicted impacts to both local drainage systems during construction and to the broader, long term hydrological process and the inter-related physical riverine and wetland environments.

The impact of a raised embankment has potential to create ponding on the upstream side of the road; however, it is noted that any ponding that does occur is not expected to be present for any longer than currently occurs along the existing alignment due to natural irregularities of the ground profile (Greenfield Technical Services, 2009). The placement of the drainage culverts (including balancing culverts) will be determined during the detailed design stage of the road. These drainage culverts will be placed at natural low points and in areas where the road is likely to act as a barrier to natural drainage to ensure that ponding upstream of the alignment in low flows is minimal and that the drainage shadow phenomena is unlikely to occur.

A hydrological and environmental assessment (GHD 2007a) indicated that although the proposed works would induce changes to the dynamic geomorphology of the Akanyaru River and Akagera River floodplain, there would be no significant alternation to habitat structure, food webs or biodiversity.

The study has predicted the likely ultimate extent of scour, which is considered inevitable with the upgrade of road infrastructure in this region. This scour extent will not adversely impact the environment for two reasons. Firstly there is no vulnerable flora required to be protected in these locations. Secondly, the whole of the Akanyaru River and Akagera floodplain from Akanyaru and Akagera Crossing down to the river mouth is very dynamic in nature and after every flood event, channel branches shift and billabongs are either enlarged or silt up. On this scale, the excavation work proposed under the bridges is of insignificant proportion.

The extent of scour downstream of the bridges was estimated to be at the point where the constructed flow from the bridges expanded sufficiently to assume a flow regime similar to the pre-construction environment. As scouring and deposition are dynamic, natural processes that occur during flooding irrespective of anthropogenic influence, the systems will naturally develop an equilibrium state that is likely to shift with every major flood. The introduction of structures will shift the natural equilibrium; however, it will be likely to return to a relatively stable state over time. In the instance of very complex hydrological systems such Akagera and Akanyaru Crossing, there may be unforeseen scour impacts as it is difficult to predict the behaviour of such systems. However, it is noted that with scour protection/minimisation works in these areas, as proposed in ESMP, iterative adjustments can be made to help minimise impacts, once the effects become observable.

In consideration of the impacts of backwater from the proposed upgrade options, distinction needs to be made between normal low flows and large flood events. With low or normal flows, the raising of the road embankment and creation of constructions within the floodplain (such as bridges, culverts and floodways) will create a backwater or afflux due to the impedance on

the flow. In low flow events, the backwater generated from the upgrade options will be minimal. With the consideration of large events, additional inundation due to backwater is unlikely to extend beyond the backwater plan therefore is unlikely to be an issue due to the sheer extent of inundation and that backwater impacts are predominantly social (i.e. effects on the community due to changes in flooding).

As mentioned earlier, there is an estimation of water level fluctuation of 1m to 3.5m during extreme weather, which is expected more frequently. This can cause flooding along the road, the bridge and the surroundings of these infrastructures supposed to be upgraded.

Area	Environmental element	Impact	Criteria	Assessment
Hydrology	Hydrological regime	Hydrology and drainage	Nature	Negative
			Component value	Medium
			Intensity	Low
			Extent	Local or regional
			Duration	Temporary
			Importance impact	Low

Mitigation measures

- *Development of effective site drainage systems*
- *Design of road drainage storm water collection systems aligns with Water Resources Management and priority project that aims to support the vulnerable areas along the road in improving water storage to cope with Climate Change and reduce pressure on drinking water supply points.*
- *Supervision of reforestation will be done*
- *Infrastructures shall be built to be resilient with extreme events*
- *Consider increasing embankment in different areas with lower levels and areas that have already been affected by different floods events*
- *The design of the bridges must take into consideration these water fluctuations and the characteristics of different floods like the highest water level attained during a flood event.*
- *There should not be a misalignment of the road and the bridges as it could itself cause failure of the bridges or create flooding around the bridges or along the road.*

7.4.8 Impact on water resources and wetlands

Groundwater

During construction, there is a certain threat of groundwater contamination through construction activities:

- Vehicles with tank/ motor oil leakage
- Fuel refilling of construction vehicles in unpaved areas
- Dumping of hazardous construction waste.

These groundwater pollution risks can be reduced with a proper HSE construction site management (HSE Management Plan), the use of well-maintained vehicles and the controlled disposal of hazardous waste.

On account of the limited duration the construction activities, it is concluded that the project has only a low impact on groundwater resources.

Conclusion for construction phase:

In general, it is concluded that the project itself will have negligible direct effects on groundwater. The groundwater pollution risk can be effectively reduced to a low level by a proper construction site management.

Surface Water

The rivers crossed by the road have higher turbidity values. There is a pollution problem of surface water caused by this high turbidity. Any contamination of these rivers could have a cumulative impact on turbidity.

The road crosses different wetlands that may be contaminated by the project activities. Gashora wetland is and will be encroached by project activities on a distance averaging 1.5km. Rwabusoro peat soil impact is also to be considered as the road is being constructed. The peat soil could spread around the marshland.

Table 7-5: Major wetlands potentially affected by the road project

Name	Sta (km)	Province	District	Sector	Cell
Akanyaru wetland	98+700	South	Nyanza	Muyira	Nyundo
Rwabusoro wetland	99+400	South	Nyanza	Busoro	Masangano
Gashora wetland	44+350	Eastern	Bugesera	Gashora	Biryogo
Akagera wetland	43+100	Eastern	Ngoma	Rukumberi	Gituza

Direct impacts on surface waters will be mainly confined to construction activities, especially during the rainy seasons.

Other negative impacts on surface water resources can be caused by:

- Oil spills resulting from fuelling or repairing activities of construction machines or badly maintained construction machines
- Dumping of construction wastes and human wastes
- Both can be prevented by a proper HSE construction site management (HSE Management Plan). By careful handling hazardous substances and careful maintenance, no negative impacts on surface waters are expected to occur.

The project will require large amounts of bitumen or bitumen emulsion usually stored in drums. These empty bitumen drums are generally recycled as steel sheeting, or used in road construction as parapets or for riverbank stabilization. When supplied and used in this manner, bitumen is not regarded as a significant environmental hazard.

It is concluded that during construction phase the project will have considerable effects on water quality during the construction period through the runoff. Suitable mitigation measures such as sand traps, re-fuelling of machinery far from water bodies, prevention of oil spills and minimisation of increase of turbidity will need to be implemented.

While an authorisation for the contractor will be required should surface water be necessary for construction purposes (e.g. for dust suppression), the volumes involved are considered unlikely to result in any significant impact.

Area	Environmental element	Impact	Criteria	Assessment
Surface waters	Quantity (m3) of the resource	Decrease of the quantity	Nature	Negative
			Component value	Low
			Intensity	Low
			Extent	Punctual
			Duration	Temporary
			Importance impact	Medium
	Pollution	Risk of degrading the quality	Nature	Negative
			Component value	Medium
			Intensity	Weak
			Extent	Local or regional
			Duration	Temporary
			Importance impact	Weak
	Flooding	Local decrease of flooding	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local or regional
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Incorporate erosion control measures*
- *Incorporate peat soil control measures*
- *Restrict construction to dry season to the extent possible.*
- *Proper disposal of construction debris*
- *Proper handling, storage of oil and oil wastes*
- *Proper disposal of wastewater / sewage at Contractor's/ workmen's camps*
- *The contractor should have erosion and pollution control plan and a water quality-monitoring plan.*
- *Opening of borrow pits and deposit at least 500 m of water points*
- *Regular collection of solid and liquid waste*
- *Appropriate measures will be taken to dispose cleared vegetation to avoid obstruction of water ways*
- *Authorization will be required from the competent authority to expand in the buffer zone and wet areas.*
- *Appropriate measures to ensure ecological functions of wetlands*

7.4.9 Impact on flora and fauna

Flora

Flora mainly consists of introduced species such as Eucalyptus. Indigenous species are only sporadic along the road and some remaining natural shrub especially around Gako military domain. Generally, the trees to be felled are Eucalyptus species and other secondary vegetation, which are not native in Rwanda (e.g. cedars, pines) and hence have only a low ecological function. Wherever possible, cutting of trees will be avoided. Felled trees will have to be compensated in case of private ownership and should be replanted in case of state property. Roadsides will have to be replanted.
The impact would be cumulative as other projects are clearing vegetation and cutting trees in the road corridor for implementation of different projects.

Linkages between the Akanyaru River and Akagera River and its floodplain are critically important to the integrity of flora and fauna that inhabit the project area. The geomorphology of the Akanyaru River and Akagera River floodplain could alter as a result of construction of the elevated roadway, subsequently impacting and possibly altering species composition, habitat structure, food-webs, biodiversity and sensitive ecological processes. However, the effect of the project to biodiversity and ecological processes is expected to be of low significance as the extent of the impact is limited in roadside areas that will be needed during existing road widening.

- **Fauna**

Proposed project activities in the study area are considered to have minimal impact on fauna species, as no species are considered to use the site exclusively. It is not considered that the extraction of material for the road upgrade will significantly alter the fauna habitat of the region. It can be considered that a disturbance will occur on a local scale, which may impact on individual animals, rather than a species. The survey area is wholly surrounded by continuous rangeland, with major disturbance by livestock grazing. The survey area does not contain vegetation or habitat zones that are not present within the surrounding areas. Impacts are likely to occur to individual animals and include:

- Minor loss of habitat and feeding areas. This is not considered to be a substantial impact on current areal extent of habitat. There will be a minor loss of refuge vegetation and associated foraging resources.
- Harm/death/displacement of individual animals may occur during borrow pit excavation and road widening area.

Akanyaru wetland is an important bird area with protected species. Although the project will slightly encroach in the wetlands buffer zone, impact on migratory birds is anticipated to be no significant as no project activities are planned on different points of the wetlands. This implies, no habitat used by IUCN/CITES species or the Madagascan Pond Heron (in the Northern part and at the junction between Akanyaru and Nyabarongo important Bird areas) is anticipated to be affected by the project activities.

Aquatic Fauna

Species that have large scale migrations between fresh and marine water habitats have the potential to be negatively impacted by any restriction to passage along the River.

Potential impacts to freshwater fish in the Akagera River are related to species habitat linkage and the potential for the proposed culvert works and floodway crossings to impede the passage of the species. Restricted passage would limit the migration of juvenile fish to big fish. Additionally, during years of low river discharge when passage has been further restricted,

predation of juveniles is likely to be higher, thus reducing recruitment during those seasons. The potential migration impacts differ slightly, dependent on the design option chosen; however, are not likely to cause any significant impact on the species:

- The design features include bridges that provide a habitat linkage, however raised floodways and embankments have an ability to result in backwater. As the floodwaters stem from the wetland, impact to the species is unlikely.

As there are no permanent or semi-permanent ponds in the project footprint, impacts on aquatic life that may be transferred to those types of water bodies during flood events is not anticipated.

Area	Environmental element	Impact	Criteria	Assessment
Flora/Fauna	Vegetation in savannas/Wildlife and birdlife	Uncontrollable clearing/Destruction of habitat	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Punctual
			Duration	Temporary
			Importance impact	Medium
		Risk of fire	Nature	Negative
			Component value	Weak
			Intensity	Weak
			Extent	Punctual
			Duration	Temporary
			Importance impact	Weak

Flora

Mitigation measures

- *Campsite clearing will be limited to the area required for widening, operation and maintenance of temporary diversion routes climbing lane and permanent road alignment.*
- *Storage areas shall be contained within the project areas and associated access routes.*
- *Vegetation will be removed by mechanical means except where other selective clearing methods are stipulated.*
- *Right-of-way boundaries and sensitive areas shall be clearly marked with flagging tape by the Engineer prior to clearing.*
- *Areas requiring selective clearing (i.e., buffer zones, sensitive sites) shall be marked prior to clearing. The Contractor or a designate will supervise the equipment operators to ensure these areas are not missed or unduly disturbed by construction equipment and related activities.*
- *Appropriate measures will be taken to dispose cleared vegetation to avoid obstruction of water ways*
- *Re-vegetation of borrow pits with original vegetation.*
- *Further as long-term mitigation measures, the habitat enrichment activities such as planting of native bamboos, other native tree species will be carried out. Environment Specialist in collaboration with Wildlife Conservator will determine the suitable plant species for wildlife*

habitat enrichment. There will be strict compliance monitoring by Environmental Specialist while constructing road through Reserve Forest area.

Fauna

Mitigation measures

- *Activities that will create significant disturbances to the environment should be avoided or kept to a minimum in areas with wildlife and birds. Such activities include clearing of vegetation, traffic diversions, haulage routes, workmen's camps and chemical spills.*
- *To reduce the possibility of vehicle and wildlife collisions vehicle speed shall not exceed posted speed limits and wildlife warning signs shall be installed where appropriate.*
- *Wildlife is attracted to untidy campsites. Cleanliness, proper storage of food and garbage and common sense are the best avoidance practices.*
- *Wildlife shall not be fed or harassed. Project personnel will be prohibited from hunting, fishing, feeding or harassing wildlife on the project site, designated access routes or borrow areas*
- *Development of vegetative plantings of known value to wildlife.*
- *Awareness campaign on no disturbance of migratory birds*
- *Areas with migratory birds should temporary restricted for any construction activity*

7.4.10 Impact on air quality

As mentioned in chapter 4, data on air quality in the catchment and project areas are not available. But, we noted the particulate matter levels might be below the occupational health standards (10mg/m3).

As the impacts of emissions of gas and dust will be felt at the immediate vicinity of the working area, they will be local in scope. They may be caused by the operative gear in restricted areas and for a limited time.

In areas of extractions of materials, the air quality may be deteriorated by the emission of dust by the particular asphalt production plants so that the emanation of bad smells due to the preparation of the tar (bitumen).

These impacts depend on the distance between the area of preparation of these inputs, the nearest houses, wind direction and the location of the concrete plant and other noisy machinery to populated areas.

Their intensity can be described as low to medium. The impact of the work on the air quality is shown by the increase in exhaust gas pollutants and dust formation. While these impacts are a nuisance to local residents and road users, they are generally not worrying because they are temporary and limited in space.

In this case, the site is likely to generate a lot of dust following the demolition, when large movements of earth and following the movement of machines that travel long distances on dirt track between the site and the areas of supply with deposition of materials.

Area	Environmental element	Impact	Criteria	Assessment
Air	Dust	Respiratory diseases	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Punctual
			Duration	Temporary
			Importance	Medium

			impact	

Mitigation measures

- *Dust emissions may be partially controlled by keeping diversions and dust prone areas (such as quarries and borrow pits) damp by application of water or by covering stock piles*
- *The location and operation of asphaltic batch plants need to be sited as far as possible from residential areas.*
- *Regular dust collection, removal and water sprinkling at the asphalt mixing and cement stabilization yards.*
- *Monthly maintenance of asphalt and stabilization plants.*
- *Surface dressing of diversions through population centers.*
- *Planting trees in the road reserve help to filter out particulate matter emitted from exhaust fumes and dust.*
- *Speed controls e.g. by temporary speed pumps on diversions where necessary*
- *As much as practical cover the material stock piles to reduce dust*
- *Use protective clothing like helmets and dust masks on construction crew.*

7.4.11 Labor camp and influxes

Work camps are supposed to be constructed to accommodate construction workers. These camps could attract up to four to five times as many camp followers (based on a family base of 4 children). Potential impacts would arise from the workforce and the spontaneous development it will attract include pressure on land and natural resources, generation of solid and liquid wastes, and increased public health risks (including an increase in prevalence of sexually transmitted diseases such as HIV/AIDS). Inappropriate solid waste disposal could lead to contamination of soil, ground water, and streams and the spread of pests and communicable diseases.

Area	Environmental element	Impact	Criteria	Assessment
Health	Lack of hygiene	Proliferation of insect and waterborne diseases	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Punctual
			Duration	Temporary
			Importance impact	Weak
	STDs and AIDS	Risks of increase of HIV/AIDS	Nature	Negative
			Component value	Strong
			Intensity	Strong
			Extent	Local
			Duration	Permanent
			Importance impact	Strong
Working area	Pressure on land and natural resources	Waste generation and public health risk	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Punctual
			Duration	Temporary

			Importance impact	Medium

Mitigation measures

- *Scale up HIV-AIDS campaigns awareness since improved human mobility and income on the transport sector especially go in tandem with increased HIV transmission. Initially, a strong awareness campaign be undertaken and relevant with all the means (media, rural radio, campaigns, theaters forum, sketch ...etc). And secondly, it sets up a curative and preventive measures campaign screening people and distribution of ARVs and condoms ... etc.*
- *Implement a sexual abuse prevention programme with focus on mobilising, informing and educating workers and populations around the site on sexual violence against the children.*
- *It should be strictly prohibited to involve children in any kind of sexual act, including prostitution.*
- *Work to minimize or altogether eliminate mosquito-breeding sites.*
- *Ensure that all equipment are in good working conditions to prevent occupational hazards*
- *Intensify awareness creation on malaria and its prevention*
- *Provision of condoms through dispensers located strategically at all workstations.*
- *Provision of information posters.*
- *The areas for the storage or handling of hazardous, toxic, flammable or pollutants should be appointed to ensure effective protection of the soil and subsoil, and allow recovery and disposal of products and / or possibly polluted land.*
- *There will be no on-site burning of solid waste to avoid the risk of fire. The contractor will develop a solid waste management plan.*
- *The vehicles can only get gas from areas specifically reserved for this purpose, these areas will be waterproofed.*
- *-The care and maintenance of vehicles and construction equipment will be performed only in specially equipped areas. The fuel depots and lubricants will be secured by intercepting basins.*
- *The sewage camps must be treated appropriately*
- *Wastewater should under no circumstances be released into depression without the possibility of flow*
- *The allocation of the labour of personal protective equipment: dust mask, anti-gas, gloves, boots, helmets, etc.*
- *The regulations governing the life inside the camp must include measures to protect the environment (ban on poaching, logging, etc.).*
- *For the safety of the staff and the immediate surroundings of the worker camps, fencing of the worker camps is recommended.*
- *The location of latrines in the camp should preferably be downhill of potable water sources, or 50 m to 100m from any water body. Communal bathrooms/ lavatories with soak away pits are less polluting option, but would be slightly more expensive*
- *The contractor shall provide sufficient toilets for men and women and water points*
- *The consultant shall prevent also any risk of employing child and appropriate measures should be implemented to monitor and avoid prostitution.*
- *The project minimize labor influx through avoiding/reducing influx where possible. The contractors will be encouraged to use local labor force in the project site and local recruitment and training will be promoted in this project,*
- *Ensuring effective contractual provisions on labor influx and workers camps management, matching contractual provisions for contractor. A workers camp management plan will be*

produced by the contractor and approved by the supervision consultant before works commencement,

- *To ensure effective supervision and contract management. The capacity of the contractor to implement the environment and Social mitigation measures will be monitored and their track record,*
- *Effective community engagement and grievance redress mechanism will be established to handled grievances,*
- *The Environment and Social mitigation measures will be incorporated into the civil works contract for LVTP. Responsibilities for managing these impacts will be clearly reflected as a contractual obligation, with appropriate mechanisms for addressing non-compliance. The contractor obligations (e.g. CESMP) will be consistent with project-level safeguard instruments.*
- *Robust measures to address the risk of gender-based violence will be implemented through: a) training of workforce about refraining from unacceptable conduct, b) informing workers about national laws, c) introducing a Worker Code of Conduct as part of the employment contract, d) introducing sanctions for non-compliance (e.g., termination) e) cooperation with law enforcement agencies and will provide workers opportunity to spend their time off away from the host community*

7.4.12 Impact on human security

Risks to human security are related to fire and handling of chemicals and explosives used for rock excavation. The scope of these impacts is limited; they are for the workers and depend on compliance with safety requirements normally expected.

Area	Environmental element	Impact	Criteria	Assessment
	Dust	Air degradation during construction		
			Nature	Minor
			Component value	Minor
			Intensity	Medium
			Extent	Punctual
			Duration	Temporary
			Importance impact	Minor

7.4.13 Noise and vibrations

Some public facilities, residential and commercial houses are closed to the road infrastructure, especially for centers constructed along the portion of the road.

The noise measured with a sound meter during the day varies between 51dB and 69dB**.** One can say they are below the acceptable levels as non-significant developments are happening along the road.

During construction and decommissioning, traffic movements, commercial activities and social premises will be associated with noise during the works. It is expected to be noisier within the active section of the corridor with additional sources of noise while the level may reduce gradually towards rural areas. Material sites are also potentially noise sources from the extraction activities including crushing and transportation.

Other impacts include;

(i) Potential disturbance to residential, commercial and institutional premises along the proposed construction roads.
(ii) Noise and vibrations caused by heavy machinery could potentially cause damage to buildings along the construction areas and materials sites.
(iii) Non-compliance with the elevated noise and vibrations regulations is a likely health problem to the immediate residents or business communities.
(iv) Non-observance with the occupational health and safety to the construction workers.

Area	Environmental element	Impact	Criteria	Assessment
Quality of life	Using explosives	Noise pollution	Nature	Negative
			Component value	Medium
			Intensity	Strong
			Extent	Medium
			Duration	Puntual
			Importance impact	Medium
		Risks of accidents	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Medium
			Duration	Temporary
			Importance impact	Low

Mitigation measures

- *Inform the neighbouring communities of any unusual construction activities with extraordinary noise levels such as to include time, expected duration and any safety precautions.*
- *Undertake structural integrity assessment of existing buildings and other structures along the road as control for damages from vibrations*
- *Utilize low noise machinery for the construction to the extent possible (Noise levels be below 70dBA to the nearest receptors by days).*
- *Undertake assessment of building structures within the work areas with respect to their capacity to withstand compaction vibrations.*
- *Limited blasting for hard stone quarries shall only be done after approval by the relevant authorities and also effective public information.*
- *Provide all construction workers with relevant safety gear including ear masks Workmen should be provided with suitable protective gear (such as nose masks, ear muffs, helmets, overalls, industrial boots, etc at all times while at work and enforce application.*
- *Working at night within settled and built up areas will be upon issuance of necessary permits from the National Environment Management Authority (REMA),*
- *In the event of commercial sources of materials, the Contractor should encourage influence due diligence.*

7.4.14 Construction waste management

Data on waste generation, source of waste and quantities disposed in existing sites within the road corridor of influence are not available.

However, it was mentioned solid waste management in those areas faces many challenges including lack of waste sorting/separation at source, poor wastes disposal and management of dumping sites, poor treatment and exploitation of the generated solid waste, among others in those rural areas, the district development plans are emphasizing that each household (100 per cent) should have a well-managed dumpsite by 2018.

As expected waste generation is associated with high intensity of social (settlements and institutional premises) and commercial activities (trading centers) a situation to be experienced in the immediate neighborhoods. The aspects will also be important for the construction (spoil disposal). Dumped wastes at road reserve sections and Waste generated from campsites together with associated spoil generation and disposal impacts would include;

(i) Potential degradation of land and physical environment at spoil disposal sites.
(ii) Aesthetic degradation at spoils disposal sites.
(iii) Risks to safety of the workers and immediate residents as well as the road users.
(iv) Risks to health on the removal and transportation of roadside solid wastes.
(v) Dumping of the solid wastes should be on approved public disposal sites.
(vi) Land degradation from pollution and debris (asphalt, concrete)
(vii) Blockage of natural drains.

Area	Environmental element	Impact	Criteria	Assessment
Solid waste	Waste	Pollution	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Wastes recovered from dump sites and road reserve shall be dumped in approved public waste disposal sites*
- *All construction camp sites shall have waste management plans and provided with appropriate waste handling equipment*
- *Spoil generated be disposed of on pre-identified and approved locations (impact assessment should be completed for the locations),*
- *Milled concrete asphalt be re-used on diversions and other public access roads in the area,*
- *Involve local Authorities on the removal and disposal of the roadside solid wastes to approve dumping areas.*
- *Construction campsites shall be provided with appropriate solid waste holding receptacles to be regularly emptied for disposal.*
- *Construction camp management to provide an inventory of waste and an acceptable waste management plan.*

7.4.15 Landscape and visual impacts

It is indisputable that any site infringes landscape values of its environment, but these attacks vary widely depending on the environment near the area of operation.

Referring to the estimated areas of quarries likely to be exploited during the construction phase, it is possible to enjoy the landscape impact as follows:

Area	Environmental element	Impact	Criteria	Assessment
Landscape	Quarry	Visual	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Medium
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

To mitigate the effects of extraction sites on the landscape, the project should:

- *Select points of attack not visible from the road;*
- *Gradually stripped the site, according to the progress of the operation;*
- *Limit and direct the operation to perform operation "hollow tooth"*
- *Adapt the surroundings career (entrance to the site access road) with some contributions in topsoil and plantations.*
- *As for the massive rock quarries, they have intrinsic landscape quality due to the configuration, appearance and color of the rock. It is conceivable to use the site into a tourist attractive place and highlighting the working face. For an attractive value to the public future operations will have to leave:*
- *Harmonious and diverse sculptural forms;*
- *Contrasting shapes and atmosphere;*
- *The securing of the most dangerous parts.*

7.4.16 Management of quarry and borrow pits

Sand, gravel, crush stone and sand stones are needed for the road base and concrete structures. As earlier mentioned, potential quarries and borrow pit sites have been identified on Ngoma - Nyanza section although final sites will be determined based on a closer comparison of environmental and social impacts. These impacts include visual intrusion because of removal of a significant part of some hills, noise (and its associated impacts on wildlife and people), sedimentation (and associated impacts on water quality) and impacts associated with the transport of material to work sites.

Area	Environmental element	Impact	Criteria	Assessment
Raw materials	Quarry and borrow pit	Deteriorated	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Punctual
			Duration	Temporary
			Importance impact	Medium

Mitigation and enhancement measures

- *Rehabilitate quarry sites and other material sites to discourage pounding which are mosquito*

breeding grounds.

- *Topsoil should be piled up for use in rehabilitation of the borrow pits.*
- *Waste excavated materials should be disposed of in a manner that ensures protection of wetlands and waterways.*
- *Explore with relevant ministries the possibility of converting quarry sites into sites of economic value e.g. dams for water supply and irrigation or a park.*
- *Careful planning of the exploitation of quarries and borrow pits will allow one exhausted section of the quarry to be reinstated and rehabilitated, while excavation begins at another section.*
- *Various types of materials need to be stockpiled separately in order to facilitate effective rehabilitation*
- *Excavation in the dry season would minimize the amount of overburden washed away by the rain.*
- *Quarries can be fenced and used as water pans for livestock or irrigation.*
- *Re-vegetation of these sites with the previously existing vegetation.*
- *The contractor should prepare for approval by the Engineer a borrow pit rehabilitation plan.*
- *Upon decommissioning, site to be rehabilitated to the satisfaction of the Engineer and in conformity of the agreed environmental mitigation plan.*

7.4.17 Disruption to access to homes and institutions

Access to homes and institutions, which is already limited in the road corridor, will be compromised by the road rehabilitation activities. Due to rehabilitation works, the duration of impact is to be considered during almost 24 months for the 130km but for a limited time on different portions of the road.

Diversions will cause temporary delays in transportation of goods and passengers, traffic congestion or accidents (especially for heavily laden trucks and trailers) along detour roads that may not have been constructed properly.

Area	Environmental element	Impact	Criteria	Assessment
Quality of life	Access to collective socio equipment	Access to health centres	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Local
			Duration	Temporary
			Importance impact	Minor
		Access to education	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Local
			Duration	Temporary
			Importance impact	Minor

Mitigation and enhancement measures

- *To maintain access to homes institutions, the contractor will implement traffic management at construction sites to enhance traffic flow and safety and public road safety awareness activities along roadside communities.*

- *Proper traffic signs shall be placed at all necessary sites in the construction area to reduce traffic congestion and safety problem.*

7.4.18 Impacts on mobility and road safety

Through villages by road construction and decommissioning, activities will result in a temporary relocation of the living environment of road users and residents.
Disruption of traffic will be due in particular to work half-floor and to the presence of heavy traffic on the road. Also, a temporary disruption of connections can be observed: problems of access to property, agricultural plots housing, etc.
Moreover, a poorly organized site and where security measures are not met, a threat to public safety and the safety of the workers.
Risks to human security are related to the movement on the axes to rehabilitate and tracks moving to borrow sites and deposit.
The scope of these impacts can be described, as the zonal activities related to the execution of the works are not confined to the site staff but also for the population living in the immediate environment of the project sites. Their duration is limited and their intensity is rather low to medium.

Area	Environmental element	Impact	Criteria	Assessment
Condition de circulation	Road safety	Risks of accidents	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium
	Mobility and traffic	Change in mobility and congestion on existing routes	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium

Mitigation measures

- *Road safety will be improved through good engineering design i.e. improving sight distance and visibility, especially approaches to bends, junctions, bridges, etc, 'and at roadside settlements.*
- *Installing clear road signs including road furniture.*
- *Discouraging parking on the road by having shoulders throughout the length of the roads.*
- *To reduce accidents, appropriate road signs and road markings will be designed in locations where standards are compromised to warn drivers of safety hazards.*
- *Guardrails should be provided in sections where the road has steep slopes.*
- *Traffic management with alternate routes should avoid impacting the sensitive areas such as the wetlands*

7.4.19 Influence on cultural heritage

During public consultations, participants were concerned of the graves that could be destroyed while constructing campsites, or any other activity of the road rehabilitation. The rehabilitation

of the 130km Ngoma - Nyanza road could affect people's individual cultural properties as well as culturally significant aspects at the community level. The project area does not have any area of spiritual significance including religious sites and shrines or burial sites for that matter that could be affected and desecrated by the road.

Area	Environmental element	Impact	Criteria	Assessment
Culture	Cultural property	Destruction	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Punctual
			Duration	Temporary
			Importance impact	Minor

Mitigation measures

- *The contractor and the company supervising the construction works should consider employing locals in priority that might not have cultural influence to the local culture*
- *Conduct an archaeological walkover survey.*
- *Any remains discovered during construction to be reported to the authority that will determine further actions required. The chance find procedures as described in section 2.51 on point 4.Physical Cultural Resources must be observed.*

7.4.20 Legally protected areas

The proposed works related to rehabilitation of the 130km including exploitation of quarries and borrow pits and construction of camp sites will not affect protected areas, as they will be confined in non-protected areas, only existing in the immediate surroundings of the project site.

7.5 Identification of impacts during road operation of the road

7.5.1 Impact on Economy

The improvement and development of means of communication and travel are essential for development. The upgrading of the road Ngoma – Nyanza road will actively contribute to:
- Opening up areas with high agricultural potential
- Initiate the development of trade across the region;
- Open up and develop agricultural areas and regional untapped potential of the entire project area;
- Encourage economic activity as commercial, agricultural (volume of commercial agricultural production), industrial (food) than tourism;
- Improve the economic conditions and the well being of populations along the routes concerned;
- Improving traffic conditions and the safety of users of the road and reduce travel time and transport costs.

The agricultural surplus production which is defined by the difference between the agricultural value added "with project" and that "without project" depends on several factors, the most important are:
- Increase of arable land for different cultures,
- Improving the quality of the farm, hence the increase in yield per hectare,

- Increasing crop available for marketing to markets, this rising incomes of carriers.
- Improvement of livestock products marketing conditions

Tourism activities will also be facilitated because of the existence of functional infrastructure. The cultural exchanges will be facilitated through the functional road. Promising niches will be opened on the development of ecotourism and hunting tourism. Overall, the impact on tourism and cultural activities is indirect, positive and moderately important.

Area	Environmental element	Impact	Criteria	Assessment
Agriculture	Agriculture production	Flow now possible of agricultural production	Nature	Positive
			Component value	Strong
			Intensity	Medium
			Extent	Local and regional
			Duration	Permanent
			Importance impact	Strong
Breeding	Pastoral production	Flow now possible to pastoral production	Nature	Positive
			Component value	Strong
			Intensity	Medium
			Extent	Regional
			Duration	Permanent
			Importance impact	Strong
Commerce and Industry	Commerce/Industry	Development of trade, product flow facilities Potential development of SME/SMI Trade roadside	Nature	Positive
			Component value	Medium to strong
			Intensity	Medium
			Extent	Local
			Duration	Permanent
			Importance impact	Medium
Craft	Utility craft and art	Development of craft activity; Trade roadside	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local and regional
			Duration	Permanent
			Importance impact	Medium
Cultural tourism	Tourism activity	Development of tourism activity	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local and regional
			Duration	Permanent
			Importance impact	Medium
	Cultural and sporting activities	Development of cultural activity	Nature	Positive
			Component value	Minor
			Intensity	Minor

			Extent	Local
			Duration	Permanent
			Importance impact	Minor

Enhancement measures

- *Ensure continual road maintenance.*
- *Promote tourism in the area rich with lakes and birdlife*

7.5.2 Improve drainage and its environmental benefits

The current drainage structures are mainly inadequate and / or in disrepair even absent in some sections. Often the structures cannot accommodate flows associated with flash floods in the wet seasons. In addition soil depositions; debris and solid waste have also clogged several drainage structures where routine maintenance activity is inactive. The project will redesign, widen and reconstruct all these structures.

The improved road drainage system and reconstruction of bridges will reduce erosion rate. The application of bioengineering measures in high erosion risk zone will reduce possible landslides. This has a positive environmental impact.

Enhancement measures

- *Sides of drainage channels shall be planted with grass or stone pitched.*
- *Drainage systems shall have scour checks.*

7.5.3 Impact on pedestrian traffic

In actual situation on the 130km, there are no areas pedestrians can move freely without fear of accidents, except in some urban areas.
Widening of shoulders to share 2.0m urban areas and 1.5m rural areas wide side of the road to allow a wider band for the many pedestrians and two wheels is considered. This provision will be applied at the common areas.
Among the most important consequences of the rehabilitation of the road is improvement of travel conditions, especially in terms of safety and comfort for pedestrians. The rehabilitation will also facilitate travel during rainy seasons blocked by the formation of mud and ruts largely due to the passage of heavy vehicles.

Area	Environmental element	Impact	Criteria	Assessment
Circulation	Road users (pedestrians)	Ease of movement	Nature	Positive
			Component value	Strong
			Intensity	Strong
			Extent	Local
			Duration	Permanent
			Importance impact	Strong

7.5.4 Impacts on transport

The first consequence of the construction and rehabilitation of roads is improved travel conditions, especially in terms of safety and comfort.

Transit time will be significantly reduced on all routes. In addition, the reduction in vehicle operating costs will have a positive impact on all transportation-related activities, including the price of long distance taxis and delivery of goods.

Area	Environmental element	Impact	Criteria	Assessment
Transport	Conditions of transport for goods and people	Transport activity transport	Nature	Positive
			Component value	Medium to strong
			Intensity	Strong
			Extent	Local
			Duration	Permanent
			Importance impact	Strong

Enhancement measures

- *RTDA should ensure continual road maintenance.*

7.5.5 Rural migration and urban development

It is difficult to assess the impact of the rehabilitation of the road in terms of rural exodus. Two opposing phenomena can indeed occur:

- Firstly, improved road will open up major business opportunities for rural people, which should improve their products, will see their living conditions improved and so will tend to remain in rural areas. In addition, the regional socio-economic development promoted by the opening up will help maintain rural populations who will benefit from its positive impact (jobs, health, education, business, equipment, services, etc.).
- On the other hand, it could also increase the departures of youth and labor (men in particular) to cities and economic centers at the expense of rural areas. Opening or upgrading of roads creates, in effect, the attraction and establishment of populations of commercial activities and to enjoy the proximity and easy access to public facilities.

Area	Environmental element	Impact	Criteria	Assessment
Displacement	Trade between rural and urban areas	Rural migration to urban centres	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Local
			Duration	Temporary
			Importance impact	Minor
		Fixation of the population in rural areas	Nature	Positive
			Component value	Minor
			Intensity	Minor
			Extent	Local
			Duration	Permanent
			Importance impact	Minor

7.5.6 Access to homes and institutions

The main causes of ill health are essentially poverty of the population, lack of health facilities that limits the level of hygiene and access to health care, the low level of training and information, financial constraints that limit the country health services.
The province has a few number of primary and secondary schools with an average of 4 schools per district in.
Access to the few infrastructures including access to health care and education will be promoted by improving road access conditions. Indeed, health centers present in some villages are often under-equipped. To get quality care, the villagers have to travel sometimes- several tens of kilometers so to reach the nearest hospital. We can then expect an improvement in the living conditions of people specifically women by improving access to health facilities.

Area	Environmental element	Impact	Criteria	Assessment
Quality of life	Access to collective socio equipment	Access to health centres	Nature	Positive
			Component value	Strong
			Intensity	Strong
			Extent	Regional
			Duration	Permanent
			Importance impact	Strong
		Access to education	Nature	Positive
			Component value	Medium to strong
			Intensity	Strong
			Extent	Local or regional
			Duration	Permanent
			Importance impact	Strong

7.5.7 Waste management

Development of the project road will encourage increased migration of people and business developments to areas adjacent to the road. Increased traffic volume and the elevated economic activities could lead to increased volumes of solid waste generation and hence corresponding problems of waste management. Roadside litter is bound to increase with rising social and economic activities along the road. This is also likely to worsen at truck parking yards, bus bays and footbridge landings.
The road crosses three different natural habitats, Akagera wetlands, Akanyaru wetlands and Gako military domain. These natural habitats could be polluted by solid and liquid and solid waste by travelers, people camping around or from truck parking yards, bus bays and footbridge landings.

Area	Environmental element	Impact	Criteria	Assessment
Solid waste	Waste	Pollution	Nature	Negative
			Component value	Medium
			Intensity	Minor
			Extent	Local
			Duration	Temporary
			Importance impact	Minor

Mitigation measures

- *Wastes recovered from dump sites and road reserve shall be dumped in approved public waste disposal sites*
- *All construction camp sites shall have waste management plans*
- *Spoil generated be disposed off on pre-identified and approved locations*
- *Involve local Authorities on the removal and disposal of the roadside solid wastes to approved dumping areas.*
- *Construction campsites shall be provided with appropriate solid waste holding receptacles to be regularly emptied for disposal.*
- *Construction camp management to provide an inventory of waste*
- *Provide waste management receptacles at strategic locations*
- *The districts should have well established systems of solid waste management*
- *Roadside drains to be provided with silt and litter traps*
- *The districts will be required to enforce effluent management*
- *Signposts are recommended and must be warning on solid and liquid waste dumping in the natural habitats.*
- *Camping or long stop over must be prohibited in the portions of road crossing the natural habitats*
- *No parking yards, bus bays and footbridge landings should be authorized in the portions of road crossed by the different vehicles*

7.5.8 Impact on safety

With the expected increase in speed, as result of the road rehabilitation, we expect an increase in risk of accidents especially near residential areas or at village crossings. It is indeed common to find pedestrians following the path, children playing in the middle of the road and domestic animals crossing the road.

It can therefore be estimated that the road will affect the safety of residents and roadsides users by increasing the risk of accidents.

Conflicts of use, potential generators of accidents tend to occur when:

The pedestrian / vehicle conflict: the conflict will be particularly important during the days of weekly markets at the time of the great pedestrian flow.

Parking Conflict / vehicles: improving the road should go hand in hand with a reduction of certain hazardous practices such as illegal parking on the road due to failure, unloading, stopping on the way of transport and large trucks, the expansion of markets on the road...etc.

Area	Environmental element	Impact	Criteria	Assessment
Security	Safety to road users	Risks of accidents due to high speed	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Permanent
			Importance impact	Medium
	Security of wildlife	Risk of accidents due to high speed	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local

			Duration	Permanent
			Importance impact	Minor

Mitigation measures

- *Potential accident hotspots shall be marked with appropriate road signs.*
- *Road design shall provide signs warning motorists about pedestrians and animals on the road.*
- *Speed control provisions such as humps will be installed near schools and approaches to trading centres or large settlements.*
- Physical barriers to mitigate risks of drowning for pedestrian moving around embankments along Akgera wetlands
- *Traffic safety awareness programmes shall be conducted both during construction and use of the road. Training will target teachers (who should train pupils), health workers, public transport drivers and police. The training will focus on elements of road safety namely: engineering, environment and awareness. The training is expected to last over the entire construction period as provided below:*
- *Once every 2 months: Training for 100 people from categories: teachers, health workers, public transport drivers and police, and provide them with requisite information packs such as brochures.*
- *Once every quarter: Print information packs such as brochures or posters to be used in next training and for display in schools and public places (taxi parks, hotels).*
- *Twice every month (in 1st and 4th week of each month): Announcements will be made on local radio stations about road safety targeting pedestrians, school children, taxi and bus drivers and motorcycle cyclists.*
- *Erect a fence on the perimeter of the worker camp for the safety of workers and the populations in the surroundings*

7.5.9 Impact on air quality

In terms of air pollution, two opposing phenomena are likely to occur:

• First, improving road conditions will generate more traffic, which implies an increase of the same order of magnitude of the number of emission sources such as vehicles.

• On the other hand, the rehabilitation of the road will increase the average traffic speeds, which leads to fluid traffic and generally lower emission ratios than those with current speeds (the atmospheric emission ratios are generally inversely proportional to traffic speeds).

The amount of pollution that a vehicle emits is dependent on many factors including whether the vehicle is a gasoline fuelled or a diesel heavy-duty vehicles.

The HDM-4 model can provide simulated values for emissions. It is time consuming and results are those of a model, with assumptions where data are not available but trying to consider all factors for prediction of emissions. In the interest of time, we have considered using calculation but taking into account the highway rehabilitation design such as pavement performance but also the overall long-term condition of road pavements directly depending on the maintenance or improvement standards applied to it.

This is a creative new approach that was developed for applying technical knowledge to the management needs of different countries.

This quantitative analysis of emissions on the road Ngona-Nyanza is based on simple calculations as given by COTAP's Carbon Emissions Calculator[30], of each type of vehicle inventoried during the

[30] **cotap.org/carbon-emissions calculator**

traffic count exercise (results in annex 6). The table below gives in total 54kg of CO2 emitted on 1km daily, which is very low.
The Cotap's calculator and the HDM-4 give the almost the same result after using the same routhness value.
A paved road is said to be in good condition if the IRI (International Roughness Index) is less or equal to 4 m/km.
As estimated by a recent U.S. government study, the "social cost" of carbon dioxide emissions may be $220 per ton. This implying the social cost of CO2 emissions on the 130km may be (1.812×220) 130USD or 943.800USD.

Table 7-6: General Impact matrix of the project

Number	**Type of vehicle**	**Number of each per day as per the traffic count**	**CO2 emitted per vehicle (g/km)**	**CO2 emissions per day (kg/km)**
1.	Motocycle	304	26	33
2.	Car	11	3	2
3.	Pick-up	23	10	4
4.	Jeep, 4WDS	0	0	0
5.	Minibuses	28	8	5
6.	Coaster	13	5	2
7.	Buses	0	0	0
8.	Light goods vehicle	0	0	0
9.	Medium track 2 axles	2	3	12
10.	Truck 3 axles	0	0	0
11.	Semi-trailer	0	0	0
12.	Truck-trailer	0	0	0
Total			57	54

Area	Environmental element	Impact	Criteria	Assessment
Air	Air quality	Emissions increase due to traffic	Nature	Negative
			Component value	Minor
			Intensity	Minor
			Extent	Local to regional
			Duration	Permanent
			Importance impact	Minor

Mitigation measures

- *Speed control provisions such as humps will be installed near schools and approaches to trading centres or large settlements.*
- *Enforce regulations against procurement, sale and use of fuels not meeting current fuel specifications.*

- *Enact regulations to require that all used vehicles imported into the country should be equipped with a functional catalytic converter.*
- *Enact regulations to require that all new vehicles imported into the country should meet a minimum emissions standard*
- *Enact regulations to restrict the age of vehicles imported into the country to a maximum number of years.*

7.5.10 Impact on surface runoff and soil

Approximately 40% of non-gaseous emissions from road transport fall on the floor and spread on a strip of a few tens of meters either side of the road. The storm water runoff causes leaching of these roads, which bear the heavy metals (lead, copper, cadmium and zinc) and hydrocarbons.

In the absence of any treatment prior to discharge, these polluted waters are an important source of pollution of soil and natural flows intercepting the axis of the road. The importance of this impact is more important since on the one hand the agricultural use of the land in the project area and the lack of water resources.

Area	Environmental element	Impact	Criteria	Assessment
Water resources	Leaching of motorable areas	Storm water Pollution	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Permanent
			Importance impact	Medium

Mitigation measures

The measures provided against soil erosion are critical to the project area, given the importance of this issue in Rwanda. These measures include:

- *Construction of culverts, ditches and downspouts concreted or masonry in vulnerable sectors, grassing the slopes and the judicious choice of storm water outfalls.*
- *The joint use of solutions combining vegetation and erosion control in "hard" infrastructure is the key to erosion management in such areas. Key actions are:*
- *Rip Rap and vegetation of steep slopes with local species (including legumes to add nitrogen to the substrate) to fix the soil and reduce erosion.*
- *Reforestation of slopes at the end of earthworks.*
- *Periodic maintenance and whether to irrigate young plantations during dry seasons.*

7.5.11 Impact on vulnerable groups

The impact on vulnerable groups will continue in the operational phase with the new opportunities the groups will find in the marketing of their products (crafts, transformation products, etc..), this will help increase the income households and improve living conditions, while facilitating their financial participation in family and community development. We note that this impact will be positive, indirect, durable and of great importance.

Area	Environmental element	Impact	Criteria	Assessment
Vulnerable groups	Life conditions of vulnerable groups	Increase of revenues	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Temporary
			Importance impact	Medium

7.6 Cumulative impacts

Cumulative impacts are possible considering exiting projects taking place on site and the surroundings. In actual facts, the rehabilitation or maintenance of the road Ngoma-Ramiro is already associated with positive and negative impacts. The Gashora marshlands irrigation project with pumping system is also an existing project being implemented in the project zone of influence. If such AfDB funded irrigation project is associated with impact of ecological functions of Gashoroa wetland and so does the road-upgrading project, it could be a cumulative impact. No abstraction of water from Akagera River and around Gashora wetland is considered for this road project.

A preliminary summary of anticipated cumulative impacts of road rehabilitation project when combined with the anticipated developments in other sectors can be described above over 5-year and 20-year planning horizons.

In the first two years, impacts are dominated by the road rehabilitation activities. The cumulative impacts should be analysed considering the new operational of the road to be rehabilitated and constructed, linking the main section. Complementary initiatives of this project as earlier proposed will also have effect on the possible cumulative impacts of this proposed road upgrading project.

Within five years some additional impacts are envisaged due to improved access following the construction phase. Key Impacts will be:

- Increased Population due to influx of tourists travelling especially to the eastern and southern parts of the country and the country in general through the new Bugesera International Airport.
- Increased pressure on land and natural resources such as trees and wildlife.
- Increased health risks (STDs including HIV/AIDS).
- Increased frequency and severity of vehicle accidents.
- Some improvement in poverty reduction.
- Intensification of agriculture in the project area due to improved extension services, better access routes from the estate and farms to the market and better access to farm inputs such as fertilizer, pesticides.
- Considerable expansion of trading centres settlements characterized by lack of planning.
- Remaining and limited forested areas increasingly encroached upon due to population increase but participatory village forestry management is likely to be introduced.

After twenty years, the situation will be stabilized but significantly changed from the current baseline. Transport communication will be significantly improved and new activities will have been attracted to the project area. The anticipated situation is:

- Population higher than during the project construction period.
- Sanitation and water supply improved.
- Health conditions improved with reduced incidence of maternal deaths, Malaria and food and water borne diseases, increased immunization coverage, hygiene and nutrition, health centres and functioning village schools.
- Health and education services improved but could be struggling to keep up with demand due to population increase.
- Improved employment in the tourism areas.
- Increased cultural integration due to increased immigration.
- Rural electrification brought in.
- Considerable out-migration and labour migration to urban areas due to natural population increase.
- Significant reduction in poverty in terms of food security, better market access, and employment.

7.7 Gender impacts

7.7.1 Impact impacts during construction phase

In districts to be crossed by the Nyanza-Ngoma road, Ngoma has the highest proportion of women with 52% while Bugesera and Nyanza have respectively 51.3% of female population relative to the male population.

In regards to the road construction and the improvement of the socioeconomic welfare of the population in general and that of women in particular, initiatives to be undertaken to improve the welfare to benefit not only the entire population, but also women in particular provided their ratio among the existing population in the area crossed by the road. There will be opportunity for women to sell meals and drinks to construction workers, which is a common positive impact for road construction projects in Rwanda.

Construction of road through trading centres and associated dust impacts would equally affect both genders (men and women traders). This is a negative impact.

There will be opportunity for employing women during road construction, a positive impact, although the number of women hired may be less than that of men for the reason that road contractors consider women less suited for strenuous menial labour. However, a gender-responsive approach would be to hire women in roles they are best suited to handle and it is proposed that 25 percent of the workers or project employees are women. Other possible hindrances to participation of women in road construction employment are:

Farming activities in the rainy seasons demand a lot of work by women, which may impede their employment in road construction.

Married women may benefit less from construction employment because their spouses may dictate whether they work on road project or not. This choice being solely a responsibility of an unmarried woman means that single women might benefit from the proposed road construction jobs more than their married counterparts.

Roadworks which block access to private property (i.e. homes) or institutions (i.e. schools, healthcare facilities, or places of worship) would affect women and girls more than men who more easily would jump across ditches and obstacles.

Spread of HIV/AIDS and teenage pregnancy are also reportedly common around workers' camps.

Area	Environmental element	Impact	Criteria	Assessment
Women and vulnerable groups	Improving living conditions of women		Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local to regional
			Duration	Temporary
			Importance impact	Medium

Enhancement measures

- *Expose and involve women in road construction and maintenance activities in an effort to transfer required skills to them*
- *Involve women in skilled labor in road construction e.g. engineers, contractors and administrators*
- *Involve women groups in environmental management of the road operation such as construction of gabions.*
- *Enhance gender sensitivity and reduce gender discrimination in construction activities, including provision of gender specific sanitation facilities at construction camp.*

7.7.2 Gender impacts during operation of the road

Women are vulnerable members of society. Their multiple roles assign them an important place in Rwandan society and consequently in development strategies. That is why particular attention must always be given to the needs of this group of the population in development projects and mainly in such transportation projects.

Rwanda women as it is the case of rural women in Africa move three times more than men (Source: World Bank). Indeed, in addition to their role at home, women participate in agricultural activities and practice porting (freight on the head) for the transport and sale of their production.

Furthermore, women are the most vulnerable to disease and other health concerns, which increase their need to travel often to the health facilities.

As it is generally the case for road projects, the upgrade of the main shaft will significantly improve the condition of women in the province of Kibungo but above sectors and villages served by the road by:

- Allowing them easier access at all times to health centers.
- Allowing them to save time and comfort during their daily trips to the river, the market or the workplace.

- Allowing girls easier access to schools and training centers, usually concentrated in large villages.

Area	Environmental element	Impact	Criteria	Assessment
Women and groups	Living conditions of vulnerable women	Improving the conditions of access to health services and education	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local to regional
			Duration	Permanent
			Importance impact	Medium
		Improving the conditions of access to employment	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local to regional
			Duration	Permanent
			Importance impact	Medium
		Improving the conditions of access to social life	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local to regional
			Duration	Permanent
			Importance impact	Medium
		Improvement of living conditions on daily basis	Nature	Positive
			Component value	Medium
			Intensity	Medium
			Extent	Local to regional
			Duration	Permanent
			Importance impact	Medium

7.8 Climate change impacts

7.8.1 Climate change impacts during construction phase

There are no available data on emissions but one can assume emission levels are below acceptable levels as there is no heavy traffic on the feeder and earth roads around the site and no industrial activities in the road corridor.

Vehicle emissions containing greenhouse gasses will be generated both during road upgrade and eventual use. Quantities generated will depend on type, age and number of equipment used during construction while operation-phase emissions will depend on traffic volume. These emissions would have a cumulative negative effect on local air quality global climate change.

Embodied carbon (EC) associated with construction of the road would also to some extent have climate change effects. EC refers to energy consumed and resultant carbon emissions

associated with production of materials used in construction of the proposed road, including extraction and transport of raw materials.

Due to lack of local emission factors, expected increment in greenhouse gases associated with construction and use of the road could not be estimated. However, potential climate change risks associated with the proposed project are outlined below:

- Increased traffic: The improved road will increase vehicular traffic as indicated in the economic feasibility report and the result will be higher greenhouse gas emissions during road use.
- The highway itself: CO_2 from road construction and maintenance.
- Indirect fuel consumption: Cars that travel on a new highway may need to travel on other roads to get to and from the highway; this will result in some additional vehicle mileage beyond the driving that takes place on the highway itself.

Area	Environmental element	Impact	Criteria	Assessment
Climate change	Air emissions	Increase of air emissions	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Permanent
			Importance impact	Medium

Mitigation measures

As soon as bitumen, steel, lime or cement are involved, the share of transport in overall road construction emissions exceeds 25 percent and may even rise beyond 30 percent for major roads. It is lower for rural roads involving the use of only local materials, where it is still above 20 percent of overall GHG emissions.

- *Optimizing works zone traffic management: Proper traffic management practices will limit GHG emissions due to traffic congestion (i.e. minimal on project road) caused by road construction works.*
- *Managing overloading: Optimally loaded trucks hauling construction materials will have lower GHG emissions than over-loaded ones.*
- *Use of low roughness: Fuel consumption of vehicles driving on a road depends, among others, on roughness of road surface. Low roughness will therefore reduce GHG.*
- *Use of modern bitumen plants that have the capacity to minimize carbon emissions.*
- *Use of existing material sources: The proposed project will entail rehabilitating an existing road and as such no significant green areas will be opened up. There are however, measures that will be applied to reduce the overall embodied carbon. For example, wherever feasible uses of existing borrow pits rather than opening new sites will reduce embodied carbon associated with sourcing and processing aggregates.*
- *Tree planting along the road: Another mitigation measure recommended for the operational phase is planting trees along the road, which would in part be undertaken for carbon sequestration, as well as beautification. Trees and shrub planting will be required to be species of local provenance, that will be suitable for the local climate and not susceptible to impacts from vehicle emissions and that require little maintenance. It is highly recommended that RTDA procure professional services for tree planting to ensure*

that the right species are planted.

- *Use of equipment in good mechanical condition: The contractor should ensure all motorized equipment is in good mechanical condition and regularly serviced to reduce emissions they generate.*

7.8.2 Climate change impacts during operation phase

Eastern Province experiences small quantity of rains and hot temperatures. According to the climate survey of 2009, It is characterized by two main seasons: one long dry season that varies between 3 and 5 months with an annual average temperature varying between 25,3°C et 27,7°C. The monthly distribution of the rains varies from one year to another. Annual rainfalls are both very weak (827 mm/an) and very unpredictable to satisfy the needs in agriculture and livestock.

Transport can be vulnerable to many different types of weather conditions, of which, some of them could be exacerbated with climate change. Climate changes relate to extreme weather conditions (e.g. storms, extreme precipitations, extreme temperatures), which on their turn may result in severe consequences for the physical environment (e.g. floods, etc) and represent risks for transport infrastructures and operations. Both temperature and precipitation represent weather stress parameters that can first contribute to initiate and accelerate some damaging effects.

Damage to the road: Higher temperatures can cause pavement to soften and expand. This can create rutting and potholes, particularly in high-traffic areas and can place stress on bridge joints/ structures. With these changes, it could become more costly to build and maintain roads. Transport conditions are also highly affected by extreme weather events such as heavy rainfall. Heavy rains may result in flooding, which could disrupt traffic, delay construction activities, and weaken or wash out the soil and culverts that support roads and bridges. Exposure to flooding also shortens the life expectancy of road. Landslides and washouts could also occur more frequently, as saturated soils are exposed to more rainwater especially in the hilly areas;

Bridge scour: This is the removal of sediment from around bridge abutments or piers. Scour, caused by swiftly moving water, can scoop out scour holes, compromising the integrity of a structure. Bridge scour is induced by the fact that water normally flows faster around piers and abutments making them susceptible to local scour. Therefore, increased flow velocities would result in scouring and weakening of the bridges.

Area	Environmental element	Impact	Criteria	Assessment
Climate change	Climate change effect on road and other infrastructures	Damage of the road and other infrastructures	Nature	Negative
			Component value	Medium
			Intensity	Medium
			Extent	Local
			Duration	Permanent
			Importance impact	Medium

Mitigation measures

- *Ensure adequate design and maintenance of road infrastructure.*
- *Floods: The points prone to floods along the road and some stream crossings which. With the surge in climate change (i.e. in an event of unusually high rainfall), some areas might be affected. In the design however, hydrology assessment was done and intervention measures put in place to mitigate impacts of floods on the infrastructure to be constructed.*
- *Use surface dressing that is characteristic to the local weather conditions. Temperature: In the design, minimum and maximum temperatures should be considered should there be a temperature variation between the extremes.*
- *Maintenance and repairing activities have to be planned long time in advance to avert any failures.*
- *Design of road drainage storm water collection systems aligns with NAPA priority 1 / GGS on Integrated Water Resources Management and priority project 4 that aims to support the vulnerable regions of the East and South East in improving water storage to cope with Climate Change and reduce pressure on drinking water supply points.*
- *Provision of boreholes to communities and villages to increase the capacity of adaptation of villages through improved drinking water supplies aligns with NAPA priority project 5.*
- *Design of lanes and road shoulders for NMT users aligns with the GGS program of Action on Low Carbon Development.*
- *Tree Planting aligns with the NAPA priority project 7 and the national strategy to combat deforestation and arrest erosion due to climate change.*
- *Replacement of rusted galvanized steel culverts with durable cement concrete culverts.*
- *Protection of culvert headwalls and bridges from scour and abrasion.*
- *Design of storm drainage collection system and appropriate retention ponds for floodwater capture and use in irrigation of farms.*
- *Provision of boreholes along the project road to improve community drinking water supplies.*
- *Design of Non-Motorized Transport (NMT) facilities in the urban sections and along the project road for safe usage by cyclists and NMT users.*
- *Increase Institutional knowledge through training and capacity building programs on climate change risks, monitoring and response planning.*
- *Increase local community knowledge, risks and responses to climate change through sensitization and awareness raising activities.*
- *Tree planting along the road corridor.*

7.9 Summary of project impacts

7.9.1 Positive impacts

The project will result in socio-economic development induced with opportunities for rapid flow of commodities and enhancement of agricultural production. Job creation for young people will be reinforced, especially at local level, with the work of high labor intensity. In addition, and thanks to the cumulative effects created by the road infrastructure, the project will generate other monetary activities at local, regional and national levels; which will contribute to the reduction of poverty, weak people and women's groups in particular. This will have the overall effect, improving the living conditions of the people of this part of Rwanda by facilitating access to health care and education.

Positive impacts during the construction phase

• Impact on income, livelihood and employment. Creation of direct and indirect jobs

Positive impacts of the road operation phase

- Improvement of marketing conditions for agricultural products
- Trade Development
- Creation of direct and indirect job opportunities
- Tourism promotion and enhancement of cultural wealth of the region
- Improving women's conditions and that of vulnerable populations
- Improved accessibility of the area
- Increased coverage of basic infrastructure
- Urbanization induced
- Increased property value of the surrounding land
- Improved air quality

7.9.2 Negative impacts

The construction phase will generate loss of land and assets, soil erosion, impacts related to noise and vibration, gas and dust emissions (earthworks, asphalt production and application of asphalt), the risk of accidental, spillage hazardous materials, use of materials and quarry sites, the proliferation of sexually transmitted diseases. The implementation of the road causes an increase in road accidents related to the increase in the speed of traffic, pollution of water by leaching of motorable areas and also the risks of spreading diseases such as AIDS related to plenty of traffic especially international freight.

Negative impacts in the preparation phase

- Relocation of the population
- Loss of farmland
- Cutting trees

Negative impacts during the construction phase

- Pollution of soil and water by: Rejection of solids and liquid waste from the campsite;
- Wildlife disturbance following the use of explosives and construction machinery;
- Impact on the landscape with the installation of the campsite, construction equipment and scrap on the edge of the road and in the borrow areas;
- Air pollution by dust emissions on the collection site during the excavation and traffic-related construction equipment;
- Air pollution by traffic on the site, by the Central bitumen and spreading coat;
- Noise pollution linked to the use of explosives and noise generated by earthmoving equipment;
- Increased consumption of water for the needs of workers and site work;
- Increased risk of injury to workers related to the use of explosives at borrow areas, the course of road works;
- Increased risk of infection with STDs (SIDA) and waterborne illness at site and at the campsite.
- Vehicle emissions containing greenhouse gasses will be generated both during road upgrade and eventual use.

Negative impacts during operation phase

- Increased risk of accidents related to the increase of traffic speed;
- Pollution runoff leaching motorable areas;

- Increased risk of contamination by STDs related to the increase in international goods traffic.
- Transport can be vulnerable to many different types of weather conditions, of which, some of them could be exacerbated with climate change.

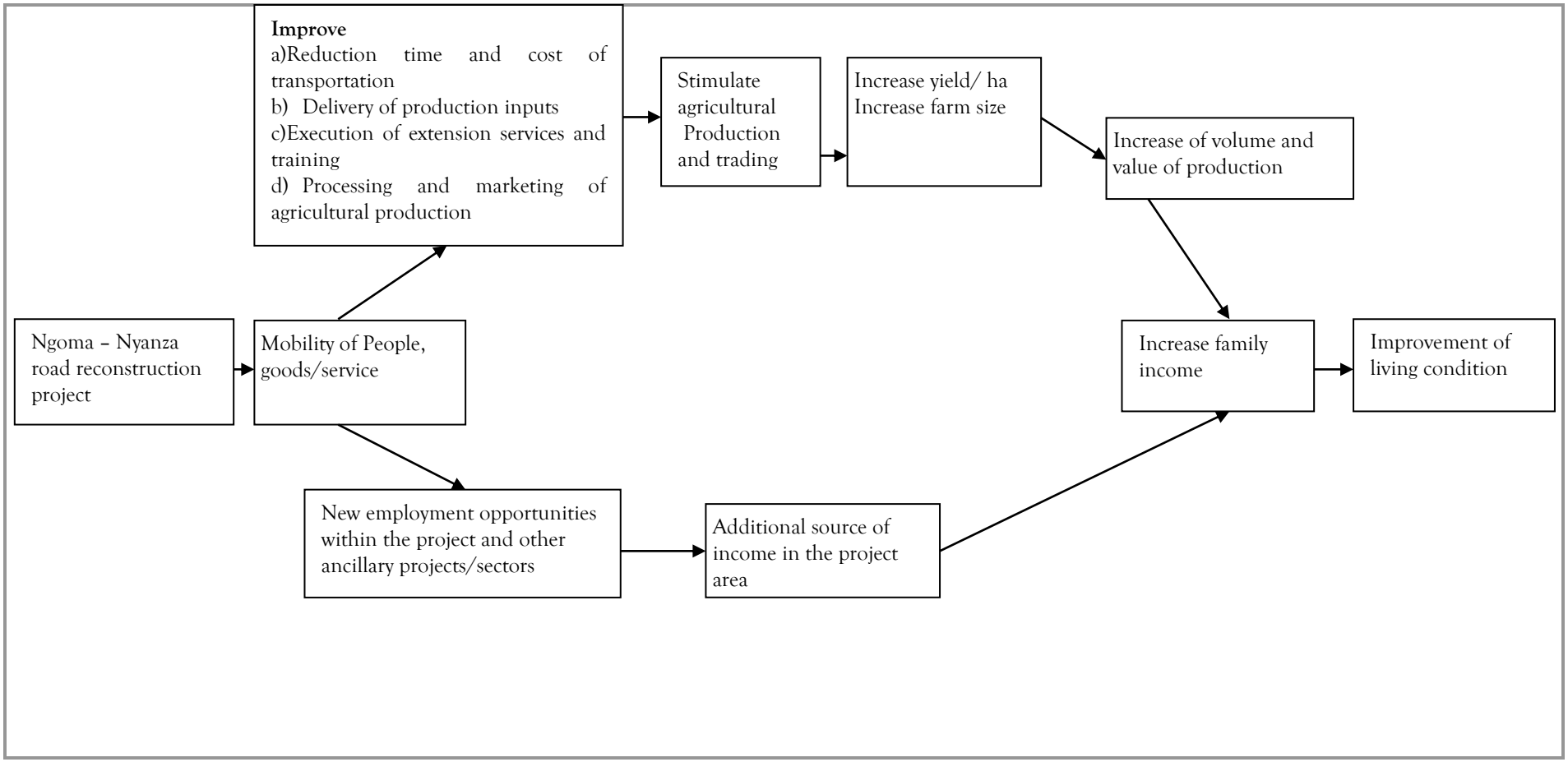

Figure 7-2: Summary of Positive Impact of Ngoma – Nyanza road project on household's gross income

7.10 Accompanying measures during exploitation of the road

This section contains measures that will be undertaken during the use of the road with the implementation of ESIA and Resettlement Action Plan (RAP) recommendations.

7.10.1 Sensitisation and assistance against HIV/AIDS

The prevention of risks associated with the spread of sexually transmitted diseases requires, on the part of national and regional health authorities, the implementation of specific awareness campaigns among villagers.

Experience shows that the most effective way to fight against sexually transmitted diseases (especially AIDS) is awareness. To this end, and like what is already in use in Kigali, it is proposed to provide a number of awareness signs to the right of the main villages along the road.

An information and awareness program is to set up in collaboration with local actions against STDs, overseen by national and international programs to fight against AIDS at the national level (National Committee for the Fight against AIDS). Operators should be mobilized and involved with preferably local NGOs working in the field of public health and possibly experienced in the approach "Information - Education - Communication".

The Company is required to organize education and awareness campaigns whether for the benefit of workers and / users of the road. Methods to succeed these compains include:

- The use of media and administrators, community leaders and policy;
- The use of modern local media (local radio);
- Laying the awareness signs
- Put in different project areas awareness banners
- Distribution of brochures,
- Meeting and village talks, etc.;

7.10.2 Measures for improving the living environment

The development of a series of additional infrastructure will better integrate the road project in his local disputes and improve its impact on the living environment:

- Planting shade trees at the level of some paths along the roads can be a positive measure appreciated by road users and especially pedestrians. With the length of the road, it is not possible to implement this measure on the entire route.
- Maintenance and regular recharging of secondary roads connecting the villages along the main high way for better efficiency of the road. The purpose of these measures includes avoiding the final displacement and facilities along the road.
- For this, priority should be given to the rehabilitation of rural roads to open up the main villages concerned and enable people to communicate more easily with the outside, to sell and supply their agricultural products and manufactured goods.

7.10.3 Measures for better landscape integration

Forest and savannah areas cleared for the purposes of the right of way must be replaced through reforestation in the project area. Also, as a compensatory measure of cleared areas, it may be

advisable to maintain a portion of the Savannah located on both sides of the road and to implement new feet in the clear, sparse parties.

Measures for better landscape integration of the project are:
- Development of entries of traversed cities and villages
- Depending on the technical feasibility, safety barriers will be made of wood, which significantly contribute to the integration of the road into the natural landscape.
- The abandoned plots resulting from correction of the road alignment will be rehabilitated in parkings and revegetated to reintegrate these areas into the natural landscape. We encourage their revegetation by subsoiling and leveling topsoil followed by grassing and planting. Trees and shrub planting will be required to be species of local provenance, that will be suitable for the local climate and not susceptible to impacts from vehicle emissions and that require little maintenance. It is highly recommended RTDA procures professional services for tree planting to ensure that the right species are planted. It is proposed to plant 0.1M trees along the 130km; meaning estimated 769 trees per kilometer.

7.10.4 Project sustainability

It is obvious that the proper management of structures and equipment conditions their sustainability and proper operation. This management includes both preventive and curative aspects and should remain the responsibility of the project developer. Thus, the Ministry of Infrastructure is required to produce an operating program of road maintenance and to designate and support a monitoring staff that will have several missions:
- Plan and ensure the maintenance of the road operations.
- Collect waste and clean the roadside.
- Ensure compliance with safety conditions by raising awareness of the local population and road users.

7.11 Management of Environmental Risk

EcoRisk View was used to analyse the environmental risk.
During construction phase, environmental risk will be linked to the essential: to oil spills, oil products, explosives and other substances that fall into the road construction. Risk of accidents could occur for both in the workplace, at the crossing of streams and rivers, as well as instances of fires for which security measures and training are provided with the competent services, including civil protection, police, forest guards etc.
These measures are:

(i) Awareness and training of sites officers and ad hoc teams in the techniques of rapid response in case of emergencies, the security measures to be respected in hazardous areas or risks,
(ii) Establishing contracts with health care workers and health centers,
(iii) The development and supply of local pharmacies,
(iv) Awareness of the local population regarding prevention against health risks and road safety;

(v) The organization of epidemiological surveys to assess the project's impacts on the environment and on human health, (vi) the development of communication equipment and rapid evacuation.

Other technical measures concern the development of secure maintenance areas for trucks and for storage of pollutants to avoid spills that can pollute natural resources. Measurements on sites will be considered to ensure good retention around the fuel storage tanks, oil and bitumen, and also to develop pits for the evacuation of oil, grease and other contaminants from liquids maintenance workshops, vehicle washing facilities and equipment and loading areas. Regarding the management of explosives, security measures should be implemented, as defined by the provisions of the Environmental Code of Rwanda.

Risk related to climate change

The rehabilitation of Ngoma-Nyanza road (130km) is classified by WB safeguards system screening as Category B requiring the development of practical risk management and adaptation measures to be integrated into the project design and implementation plans.

Ngoma-Nyanza road project has impacts that are 'less significant, not as sensitive, numerous, major or diverse. Few of the impacts are irreversible and mitigatory measures can easily be designed.

The project will involve road upgrading activities, rather than new construction

Description of climate relevant project activities	• Replacement of rusted galvanized steel culverts with durable cement concrete culverts. • Protection of culvert headwalls and bridges from scour and abrasion. • Design of storm drainage collection system and appropriate retention ponds for floodwater capture and use in irrigation of farms. • Provision of boreholes along the project road to improve community drinking water supplies. • Design of Non-Motorized Transport (NMT) facilities in the urban sections and along the project road for safe usage by cyclists and NMT users. • Increase Institutional knowledge through training and capacity building programs on climate change risks, monitoring and response planning. • Increase local community knowledge, risks and responses to climate change through sensitization and awareness raising activities. • Tree planting along the road corridor.
Alignment with/support to national or sub-national climate change strategies	• The selected interventions and activities are in alignment with the Rwanda National Adaptation Plan of Action (NAPA) priorities and Rwanda Green

	Growth Strategy (GGS) 2011 programmes of Action. • Design of road drainage storm water collection systems aligns with NAPA priority 1 / GGS on Integrated Water Resources Management and priority project 4 that aims to support the vulnerable regions of the East and South East in improving water storage to cope with Climate Change and reduce pressure on drinking water supply points. • Provision of boreholes to communities and villages to increase the capacity of adaptation of villages through improved drinking water supplies aligns with NAPA priority project 5. • Design of lanes and road shoulders for NMT users aligns with the GGS program of Action on Low Carbon Development. • Tree Planting aligns with the NAPA priority project 7 and the national strategy to combat deforestation and arrest erosion due to climate change.

7.12 Design Provisions and Required Documentation

This section provides detailed implementation of the additional complementary initiatives as proposed by the developer (RTDA) and other stakeholders including the project engineer. The initiatives are considered in the design and proposed for implementation through different phases of the project.

7.12.1 Awareness of stakeholders in Environmental Protection

Sustainable management of natural resources and the environment, require stronger and significantly of stakeholder involvement process in the sense of a partnership based not only on capacity building, but especially on the information sharing, consultation and joint decision, decisions at all levels and with all concerned parties. The Stakeholder Engagement Plan (SEP) has is presented in Annexure 10 of this document.

The main actors involved in the program are:

- The State (administration, technical services, etc.);
- The districts, sectors and cells involved in the project;
- The Non-Governmental Organizations, Community Based Organizations and other associations, acting in the natural resources sector, the environment and the management of the living environment;
- The environmental protection associations;
- Private companies of Public Works;
- Networks Dealers.

The involvement mechanisms must consider the following requirements:
- Information about the road project;
- Participation in the validation of the ESMP (information sessions and public hearings);
- Information on the timing of implementation of the ESMP;
- Participation in session's validation studies;
- Involvement of all stakeholders in the monitoring process.

Table 7-7: Environmental Awareness Programme

Specific objectives	*Measures proposed*	*Implementation period*	*Objectively verifiable indicators*	*Means of monitoring*
Awareness of local residents and site personnel on environmental issues of the project	*Awareness campaigns and meetings of residents and staff*	*Before the start of work and at a frequency to be determined by the environmental monitoring committee*	*Number of meetings held and public consultation* *Number and types of messages broadcasted on local communication channels*	*Reports of awareness campaigns and meetings, developed by the Environmental Cell*
Elaboration of internal rules for the respect of the environment by the site staff	*Drafting internal regulations for environmental protection*	*When works start*	*Number and type of concrete actions initiated in the field by the site staff for the preservation of natural resources* *Number and types of penalties for non-compliance with environmental regulations*	*Monthly reports of environmental activities from environmental Cell*

7.12.2 Construction of bus stop shelters, crops and fruits selling points

As suggested in the consultation meetings, the construction of bus stop shelters together with crop and fruits selling points, as well as restaurants on the bus stop points will improve the safety around the road and boost the socioeconomic activities and welfare of the local population.

7.12.3 Water Provision

Social amenities such as boreholes to be provided for them as way of community social responsibility. It is proposed of at least 15 boreholes distributed in the five districts are identified for exploitation during and after road rehabilitation.

Along the project road corridor, water supplied from groundwater is mostly provided by boreholes with hand-pumps or hand-dug wells that are usually equipped with a bucket and windlass or a hand pump. Common depths of boreholes are in the range of 20 to 90 meters. Hand-dug wells are shallow with depths ranging from a few meters to seldom above 16 meters.

The borehole itself - US$ 700 per meter deep. One borehole would cost around 38,000USD.

7.12.4 Breastfeeding points

It was proposed each lot for the three lots has 3 breast feeding points. These points will allow women to relax and get a comfortable place for breast-feeding. The breast-feeding reduces the risks of infections and enhances the ponding process between baby and the mother and is associated with better health for both. With an estimated cost of USD 5000 each, the total cost would be USD45, 000.

8. Environmental and Social Management Plan (ESMP)

8.1 Introduction

All environmental and social concerns will be mitigated and enhancement measures will be considered for the positive impacts as detailed in the ESMP. A framework for the implementation and monitoring of the ESMP has been proposed and budgeted for. Compared to socio-economic benefits of the road project, many of the negative impacts will be insignificant as long as fair compensation and mitigation actions are implemented.

It is recommended that the project go ahead with the implementation of the ESMP proposed in this report to mitigate the foreseen environmental and social impacts. In overall terms, Best

Engineering Practices should be employed and proactive measures during O&M should be implemented and if achieved, the environmental and social impacts of the project should be easy to mitigate.

The key identified issues with the corresponding proposed mitigation measures are highlighted in the table below. It is anticipated that the contractor will update the ESMP in line with the final detailed designs; and give site specific mitigation actions.

Table 8-1: Key identified issues and proposed mitigation measures

	Key issues	Mitigation measures
1	Loss of assets	Fair expropriation and resettlement facilitation according to the appropriate laws, of the PAPs, before commencement of civil works
2	Public utilities infrastructure and service disruption	In collaboration with the relevant service providers, agree on adequate mechanisms for relocation of affected utilities and non-interrupted service delivery.
3	Slope destabilisation along right of way	Implement appropriate measures to stabiles affected slopes simultaneously with construction progress.
4	Occupational health and safety risks	Development and effective implementation of an occupational health and safety management plan, to cover all project phases.
5	Landscape degradation due to material acquisition and overburden disposal	Development and effective implementation of quarry, borrow pit rehabilitation; and dumping sites management plan.
6	Labour influx associated environmental and social risks	Minimize labour influx by hiring local labour force. Effective contractual provisions to ensure effective implementation of the labour influx management plan.

Further details of the potential environmental and social impacts presented in table 8.1.

Table 8-2: Environmental and Social Management Plan (ESMP)

Impacts	*Mitigation and enhancement measures*	*Specific objectives*	*Implementation period*	*Monitoring Indicators*	*Estimated cost (Rwf)*
	Enhancement measures				
1. Income, livelihood and employment	*-Preference for casual labourers should be given to local population* *-RTDA can make it a contractual obligation for the road contractor to hire a specific percentage of women.* *-RTDA can make it a contractual obligation for the road contractor not to hire children for any work to be performed within the campsite or on the site.*	*Job creation.* *Casual labourers given to local people* *Recruit an agreed percentage of women* *No children performing any work on site*	*Just before construction and during construction*	*-Number of persons employed* *-Number of local employees* *-Number of women employed* *-Number of children employed*	*Good practice*
2. Pedestrian traffic	*RTDA should ensure that road design has provided facilities and signage for pedestrians to cross the road.*	*Ease pedestrians and ensure their safety*	*During operation*	*-Number of accidents on pedestrians*	*RTDA usual activity*
3. Transport	*-Realize the project and maintain the road infrastructure*	*Ensure traffic on the road section between Ngoma and Nyanza*	*During operation*	*-Number of road users*	*RTDA usual activity*
4. Increased economic activity	*Ensure continual road maintenance*	*Road well maintained through the 130km*	*During operation*	*-Frequency of maintenance activities* *-Number of residents involved in economic activities*	*Operational cost*
4.1 Agriculture/ Livestock	*Realize the project and enhance such positive impact (agriculture and livestock)*	*Development of agriculture and livestock.*	*During construction and operation*	*-Growth of agro-pastoral production*	*13,500,000*
4.2 Trade	*Complete the project and maintain the road*	*Trade sectors*	*During Operation*	*Growth rate of*	*Operational cost*

4.3 Industry	*infrastructure to sustain the gains*	*Development and Industry*		*the volume of trade in goods and travellers* *Number of SMEs / SMIs installed*	
4.4 Tourism and cultural activities	*-Maintain regularly the road to sustain the gains* *-Promote tourism in the area rich with lakes and birdlife*	*Development of tourism and cultural activities.*	*During Operation*	*-Statistics of tourist arrivals and cultural activities*	*External cost*
4.5 Craft	*Maintain regularly the road to sustain the gains*	*Flow of handicrafts.*	*During operation*	*-Growth of craft production*	*Operational cost*
5. Living conditions of women and vulnerable groups	*-Income increase of women in the restoration activities, commerce and crafts during the work.* *-During operation, possibility for women to gain opportunities (road maintenance)* *-Consider involving vulnerable groups through different project phases with different activities (tree nurseries, cleaning, security, road, campaign,.. etc*	*Improve the conditions of vulnerable groups including women*	*During and after construction*	*-The number of projects/activities initiated for vulnerable groups including women* *-Number of micro projects implemented*	*Best practice*
6. Traffic Safety and security	*-Presence of police officers in critical areas* *-Sidewalks for pedestrian villages;* *-Educate herders and farmers to the risks associated with the presence of their animals on the road.* *-Potential accident hotspots shall be marked with appropriate road signs.* *-Road design shall provide signs warning motorists* *-Speed control provisions such as humps will be installed near schools and trading centres or large settlements.*	*Increase the safety of road residents*	*During construction and operation*	*-Presence (frequency) of police officers along the road* *-Number of accidents on the road per period of time.* *-Number of signs warning motorists missing on appropriate*	*31,700,000*

	-Traffic safety awareness programmes shall be conducted *-Erect a fence around the worker camp* *- Provide periodic safety and security sensitization sessions to workers and adjacent population.*			*locations* *Traffic safety awareness programmes (number per period of time)*	
7. Drainage and its environmental benefits	*-Sides of drainage channels shall be planted with grass or stone pitched.* *-Drainage systems shall have scour checks*	*Improve the drainage and its environmental benefits at maximum*	*During construction and operation*	*-Percentage of Sides of drainage channels planted with grass or stone pitched* *-Percentage of drainage systems with scour checks*	*Included in the project cost*
	Mitigation measures				
1.Loss of land and assets	*-Those affected will be compensated according to the official compensation rates.* *-The acquisition of the land and private properties will be carried out in accordance with Rwanda Expropriation law for public interests, World Bank OP 4.12, RAP and entitlement framework for the project.* *-Early identification of entitlement for compensation planning of Resettlement and Rehabilitation Action Plan to compensate the losses.* *-The compensation will be paid in accordance with Expropriation law and will decided by competent authorities.* *-All the affected people will be compensated as per regulation before commencement of*	*-Fair compensation* *-Expropriation and compensation as per the expropriation law and related WB operation policy*	*During design and planning phase/before construction*	*-Number of PAPs compensated versus not compensated* *-Areas restored after construction and areas not restored* *-Number of complains on expropriation* *-Number of PAPs not compensated after the start of construction*	*RAP Cost*

	Construction works. *-Restoration of land after road construction must be done.* *-Covering the side drains with concrete blocs and use these blocks as pathways and buffer area between the road and surroundings can reduce the number of houses to be demolished.* *-The design will minimize the land to be acquired temporary or permamently. Construction activities will be confined on the strcict minimum of land required. Barriers are recommended to show the boundary of construction activities especially on areas closed to the three critical habitats*			*-Landtake from the boundaries of Gako natural military domain, Akanyaru and Akagera wetlands*	
2. Crops damages and trees cutting	*-The drains will be designed and constructed with several outlets so that minimum volume of runoff are directed to the farms so as to reduce water logging or alternatively they should be directed to water bodies.* *-Only trees planted in areas designated for road upgrading must be cut. All other trees should not be touched whatever the need* *-Trees cleared must be replanted elsewhere to improve the green of the site and its environment*	*Minimize crops damages and trees cutting*	*During design and planning phase/before construction*	*-Designed drains with outlets* *-Number of trees to be cleared* *-Number of trees replanted*	*92,000,000*
3. Erosion and pollution	*-Natural drainage shall be maintained.* *-Drainage water from construction areas shall be diverted through vegetated areas prior to entering a water body.* *-Ditches stabilized with bioengineering methods* *-Run-off diverted away from erosion* *-Sedimentation control shall be provided in*	*Maintenance of natural drainage and runoff controlled with engineering methods*	*During construction*	*-Water flow with the drainage structures* *-Water quality monitoring of the nearest river* *-Number of*	*32,560,000*

	sloped work areas and work areas adjacent to water bodies. *-Wastewater resulting from washing not discharged directly into waterways.* *-Vehicles and equipment shall be cleaned at a location dedicated for that purpose.* *-Surplus excavated soil shall not be stockpiled near wetlands or adjacent to streams.* *-Surplus soil shall be removed to an approved disposal area.* *-Oil, fuel, lubricant spillage can be avoided during maintenance activities.* *-Improved disposal of solid wastes* *-Local authorities and bus companies should provide dustbins at convenient positions.*			*construction structures for drainage and soil erosion* *-Amount of sediments in affected water bodies* *-Oil, fuel and lubricant spillage*	
4. Impact on vegetation	*-Replantation of tree cut will be done along the road sides* *-Compensation will be provided for private tree cut* *- Supervision of reforestation should be appropriately done* *-Consider restoring indigenous species (list in annex 5)* *-The contractor should ensure a minimum vegetation is cleared in the buffer zone and a structure should be erected to protect the wetland from contamination* *-The cleared vegetation in the buffer zone must be restored elsewhere.* *Regularly clear these invasive species and avoid dumping all king of waste along the road and in*	*-Replace the vegetation cleared at 100% and plant more*	*During construction and operation*	*-Number of trees planted* *-Number of trees compensated and not compensated* *-Number of indigenous species* *-Vegetation lost in the buffer zone and restored elsewhere (ha)* *-Frequency of invasive species clearing* *-How of waste dumped along the*	*Included in the project cost*

	the Gako military domain area as this may increase the proliferation of these invasive species.			*road and in Gako military domain area*	
5. Hydrology and drainage	*-Design and implement adequate hydraulic structures for storm water disposal.* *-Use the existing drainage channels and construct others as cut off drainages.* *-Design of road drainage storm water collection systems aligns with water resources management and priority project that aims to support the vulnerable areas along the road in improving water storage to cope with Climate -Change and reduce pressure on drinking water supply points.* *-Supervision of reforestation will be done appropriately* *-Infrastructures shall be built to be resilient with extreme events.* *-Consider increasing embankment in different areas with lower levels and areas that have already been affected by different floods events* *-The design of the bridges must take into consideration these water fluctuations and the characteristics of different floods like the highest water level attained during a flood event.* *-There should not be a misalignment of the road and the bridges as it could itself cause failure of the bridges or create flooding around the bridge or along the road.*	*The hydraulic structures operate appropriately*	*Construction*	*-Maintenance of recharge and quality of aquifers, water quality and quantity in surface waters*	*Included in the project cost*

6. Water Resources and wetlands	*-Restrict construction to dry season to the extent possible.* *-Proper disposal of construction debris* *-Proper handling, storage of oil and oil wastes* *-Proper disposal of wastewater / sewage at Contractor's/ workmen's camps* *-The contractor should have erosion and pollution control plan and a water quality-monitoring plan.* *-Opening of borrow pits and deposit at least 500 m of water points* *-Regular collection of solid and liquid waste* *-Appropriate measures will be taken to dispose cleared vegetation to avoid obstruction of water ways* *-Authorization will be required from the competent authority to expand in the buffer zone and wet areas.* *-Appropriate measures to ensure ecological functions of wetlands (avoid as much as possible encroaching in wetlands and the buffer zones)* *-Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area.* *Providing bulk bituminous storage tank instead of drums for storage of bitumen and bitumen emulsion.* *Providing impervious base at bitumen and emulsion storage area and regular clearing of any bitumen spillage for controlled disposal.* *Reusing bitumen spillage.*	*Fight against pollution of surface and ground water* *Authorization obtained as the road activities encroach the buffer and wet zones.*	*When the construction works start and during construction*	*-Amount of construction debris on site (m3)* *-Non adequate hydrocarbon storage (m3)* *-Compliance with water quality standards* *Sheets laboratory* *-Report of receipt of drilling works* *-Flooding events through wetlands (number)* *-Areas of wetlands and buffer zones encroached by project activities* *-Water flow through water ways (m3/s)* *-Frequency of solid and liquid waste collection and disposal (Nber/week).* *-Vehicle maintenance record, review plans for waste*	*14,000,000 (**)*

	Disposing non-usable bitumen spills in a deep trench providing clay lining at the bottom and filled with soil at the top (for at least 0.5 m).			*management and oil handling practices.*	
7. Flora	*-Activities with significant disturbances to the environment avoided or kept to a minimum.* *-Clearing of vegetation will be limited to the area required for widening, operation and maintenance.* *-Vegetation removed by mechanical means except where other selective clearing methods are stipulated.* *-Campsite boundaries and sensitive areas shall be clearly marked with flagging tape by the Engineer prior to clearing.* *-Areas requiring selective clearing (i.e., buffer zones, sensitive sites) shall be marked prior to clearing.* *The Contractor or a designate will supervise the equipment operators to ensure these areas are not missed or unduly disturbed by construction equipment and related activities.* *-Planting groves and street trees along the road and crossing towns.* *-The habitat enrichment activities with planting native bamboos, fruiting and fodders trees will be carried out. The trees shall be planted along the raod and in cleared areas free of road infrastructures.*	*-Reduce the rate of destruction of natural vegetation*	*Before and after construction*	*-Areas cleared with vegetation and non required for widening, operation and maintenance* *-Vegetated areas non removed by mechanical means* *-Areas cleared selectively* *-Number of groves and street trees planted* *-Number of native bamboos and other native tree species planted*	*Tree planting cost aboveTree planting cost above*
8. Fauna	*-Activities with significant disturbances to the environment avoided or kept to a minimum.*	*-Reduce the project's impact on wildlife and*	*During construction and*	*-Number of recorded vehicle*	*28,000,000*

	-Reduce the possibility of vehicle and wildlife collisions *-Vehicle speed shall not exceed posted speed limits* *-Wildlife is attracted to untidy campsites.* *-Wildlife shall not be fed or harassed.* *-Project personnel will be prohibited from hunting, fishing, feeding or harassing wildlife on the project site* *-The installation of guardrails or similar obstacles (preferably wood to better integrate into the natural landscape)* *-Protection of drinking basins against pollution.* *-Awareness campaign on no disturbance of migratory birds* *-Areas with migratory birds should temporary restricted for any construction activity*	*wildlife habitat*	*operation*	*collisions* *-Number of wildlife species attracted to untidy campsites* *-Number of personnel reported hunting, fishing or harassing wildlife* *-Number of people trained on disturbance of migratory birds* *-Number of areas marked for migratory birds*	
9. Air quality	*-Dust emissions may be partially controlled by keeping diversions and dust prone areas* *-Asphaltic batch plants need to be sited as far as possible from residential areas.* *-Regular dust collection, removal and water sprinkling at the asphalt mixing and cement stabilization yards.* *-Monthly maintenance of asphalt and stabilization plants.* *-Surface dressing of diversions through population centers.* *-Proper maintenance of vehicles and machinery* *-Construction activities will be scheduled carefully*	*Fight against pollution of air* *Buy acceptable fuel quality*	*When the construction works start, during construction and operation*	*-Amount of dust emitted at sensitive areas* *-Quality of air on sites and in the surroundings* *-Quality of air emitted by construction vehicles*	*35,000,000*

	-Nighttime's uses of certain noisy machines, such as pile drivers and concrete vibrators, regulated. *-Establishing a legal system where fines are imposed on offenders.* *-Planting trees in the road reserve help to filter out particulate matter emitted from exhaust fumes and dust.* *-Speed controls e.g. by temporary speed pumps on diversions where necessary* *-As much as practical cover the material stock piles to reduce dust* *-Use protective clothing like helmets and dust masks on construction crew.* *-Speed control provisions such as humps will be installed near schools and trading centres or large settlements.* *-Enforce regulations against procurement, sale and use of fuels not meeting current fuel specifications.*				
10. Labor camp and influxes	*- Regular training of workforce about refraining from unacceptable conduct and informing them workers about national laws* *- Introducing and regularly utilizing a Worker Code of Conduct as part of the employment contract* *- Employing sanctions for non-compliance (e.g., termination)* *- Cooperation with law enforcement agencies* *- Provide workers opportunity to spend their time off away from the host community,* *-Scale up HIV-AIDS campaigns awareness since*	*Reduce the risks of infection to HIV/AIDS*	*When the construction works start and during construction*	*-Number of areas with open water left or standing water* *-Number of equipment not in good conditions* *- Number of condoms distributed on site.-How many awareness*	*54, 300,000*

	improved human mobility and income on the transport sector especially go in tandem with increased HIV transmission. *-Implement a sexual abuse prevention programme with focus on mobilising, informing and educating workers and populations around the site on sexual violence against the children.* *It should be strictly prohibited to involve children in any kind of sexual act, including prostitution.* *-Work to minimize or altogether eliminate mosquito-breeding sites.* *-Ensure that all equipment are in good working conditions to prevent occupational hazards* *-Intensify awareness creation on malaria and its prevention* *-Provision of condoms through dispensers located strategically at all workstations.* *-Provision of information posters.* *-The areas for the storage or handling of hazardous, toxic, flammable or pollutants should be appointed to ensure effective protection of the soil and subsoil, and allow recovery and disposal of products and / or possibly polluted land.* *-There will be no on-site burning of solid waste to avoid the risk of fire. The contractor will develop a solid waste management plan.* *-The vehicles can only get gas from areas specifically reserved for this purpose, these areas will be waterproofed.* *-The care and maintenance of vehicles and*			*capaigns were conducted on sexual abuse and prostitution in general and related to children under 18* *-How many workers and people were mobilized, informed and educated on sexual abuse of children* *-Number of cases of malaria and other diseases* *-Number of available condoms* *-Number of information posters* *-Number of personnel equipment on site and use and condition of PPE.* *-Labor influx (number/period of time)*	

	construction equipment will be performed only in specially equipped areas. The fuel depots and lubricants will be secured by intercepting basins. *-The sewage camps must be treated appropriately* *-Wastewater should under no circumstances be released into depression without the possibility of flow* *-The allocation of the labour of personal protective equipment: dust mask, anti-gas, gloves, boots, helmets, etc.* *-The regulations governing the life inside the camp must include measures to protect the environment (ban on poaching, logging, etc.).* *-For the safety of the staff and the immediate surroundings of the worker camps, fencing of the worker camps is recommended.* *-The location of latrines in the camp should preferably be downhill of potable water sources, or 50 m to 100m from any water body. Communal bathrooms/ lavatories with soak away pits are less polluting option, but would be slightly more expensive.* *-The contractor shall provide sufficient toilets for men and women and water points* *-The consultant shall prevent also any risk of employing child and appropriate measures should be implemented to monitor and avoid prostitution.* *-The project to minimize labor influx through maximizing hiring locals for skilled and*			*-Number of locals employed* *-Number of grievances handled and not handled* *-Number of employees trained and not trained on code of conduct and enforcement of laws*	

	unskilled jobs where possible. The contractors will be encouraged to use local labor force in the project site and local recruitment and training will be promoted in this project, *-Ensuring effective contractual provisions on labor influx and workers camps management, matching contractual provisions for contractor.* *-A Workers Camp Management Plan will be produced by the contractor and approved by the supervision consultant before works commencement,* *-To ensure effective supervision and contract management. The capacity of the contractor to implement the Environment and Social mitigation measures will be monitored and their track record,* *-Effective community engagement and grievance redress mechanism will be established to handled grievances.* -				
11. Surface runoff and soil	*-Construction of culverts, ditches and downspouts concreted or masonry in vulnerable sectors, grassing the slopes and the judicious choice of storm water outfalls.* *-The joint use of solutions combining vegetation and erosion control in "hard" infrastructure is the key to erosion management in such areas. Key actions for this, are:* *-Rip Rap and vegetation of steep slopes with local species (including legumes to add nitrogen to the substrate) to fix the soil and reduce*	*Reduce runoff and soil erosion impact with appropriate infrastructures and techniques*	*During operation*	*-Areas eroded (sm) and runoff (mm) in the zone* *-Slopes reforested* *-Frequency of irrigating young plantation during dry season*	*16,260,000* *Construction works are included in the project cost*

	erosion. *-Reforestation of slopes at the end of earthworks.* *-Periodic maintenance and irrigation of young plantations during dry seasons.*				
12. Noise and vibrations	*-Inform the neighbouring communities of any unusual construction activities* *-Undertake structural integrity assessment of existing buildings and other structures along the road as control for damages from vibrations* *-Utilize low noise machinery for the construction to the extent possible (Noise levels be below 70dBA to the nearest receptors by days).* *-Undertake assessment of road structures within the work areas with respect to their capacity to withstand compaction vibrations.* *-Limited blasting for hard stone quarries shall only be done after approval by the relevant authorities and also effective public information.* *-Provide all construction workers with relevant safety gear* *-Working at night within settled and built up areas will be upon issuance of necessary permits* *-In the event of commercial sources of materials, the Contractor should encourage influence due diligence.*	*Rehabilitate and operate the road at acceptable noise level for population living in the surroundings, travellers and workers on site*	*During construction and operation*	*How often the neighboring is informed in case of unusual construction activities* *Noise level (dBA)* *-Number of blasting events*	*16,500,000*
13. Solid waste management	*-Wastes recovered from dump sites and road reserve shall be dumped in approved public waste disposal sites* *-All construction camp sites shall have waste management plans* *-Spoil generated be disposed of on pre-identified*	*Waste management plan to clean the construction sites and campsites.* *Solid waste management plan for the concerned*	*During design, construction and operation*	*-Amount of waste (kg or m3) in the demarked waste collection area* *-Spoil disposed on non approved*	*41,800,000*

	and approved locations. *-Involve local authorities on the removal and disposal of the roadside solid wastes to approved dumping areas.* *-Construction campsites shall be provided with appropriate solid waste holding receptacles to be regularly emptied for disposal.* *-Construction camp management to provide an inventory of waste* *-Provide waste management receptacles at strategic locations* *-The districts should have well established systems of solid waste management* *-The districts will be required to enforce effluent management* *-Signposts are recommended and must be warning on solid and liquid waste dumping in the natural habitats.* *-Camping or long stop over must be prohibited in the portions of road crossing the natural habitats* *-No parking yards, bus bays and footbridge landings should be authorized in the portions of road crossed by the diffeerent vehicles.*	*districts during operation*		*locations (m3)* *-Solid waste regularly collected from the campsites* *-Solid waste daily stored in the campsites (m3)* *-Amount of waste retained in the roadside drains* *Number of signposts warning on dumping in natural habitats* *-Amount of waste monthly dumped in the natural habitats or along the natural habitats* *-Frequency of stop over or camping in portions of road crossing the natural habitats* *-Number of parking yards, bus bays and footbridge landings authorized in the*	

				portions of road crossed by the diiferent vehicles.	
14. Landscape and visual impact	*-Planting of street trees along the road in the main sections.*	*Reduce the visual impact on the landscape*	*After construction*	*The number of trees planted*	*86,000,000 (***)*
15. Quarries and borrow pits	*-ESIA to be conducted before the site is opened by the project. This includes documentation and compensation for any required land acquisition and restriction of access.* *-Rehabilitate quarry sites and other material sites* *-Topsoil should be piled up for use in rehabilitation of the borrow pits.* *-Waste excavated materials should be disposed off to avoid any pollution of soil or water.* *-Convert quarry sites into sites of economic value e.g. dams for water supply and irrigation.* *- Promote safety of the sites by (a) establishing a physical perimeter around the site, (b) use of Personal Protective Equipment at all times by the workers on site, and (c) holding sensitization sessions with the neighboring communities on the construction site safety. -Various types of materials need to be stockpiled separately* *-Management of runoff:* *- Excavation in the dry season would minimize the amount of runoff.* *- Use of physical barriers around the site perimeter.*	*All quarries and borrow pits are rehabilitated to blend into the existing environment*	*During construction and right after construction*	*-Number of quarries and material sites not rehabilitated* *-Absence of open water that can be used by breeding mosquitos* *-Number of incidents among workers and citizens.*	*47,000,000*
16. Access to homes and	*-To maintain access to homes and institutions,* *-Proper traffic signs shall be placed at all*	*Maintain a safe traffic along roadside*	*During construction and*	*-Flow of vehicles along the road*	*13,500,000*

institutions	*necessary sites in the construction area*	*communities with proper traffic signs*	*operation*	*and especially with the construction sites (km/h)* *-Delay when crossing different areas and construction sites (hours)* *-Time with absence of crossing*	
17. Mobility and Road Safety	*-Road safety will be improved through good engineering design* *-Installing clear road signs including road furniture.* *-Discouraging parking on the road by having shoulders throughout the length of the roads.* *-To reduce accidents, appropriate road signs and road markings* *-Guardrails should be provided in sections where the road has steep slopes.*	*Maintain flow, safety at critical areas and minimize the number of accidents along the road*	*During design and construction*	*-Number of road signs planned to be installed along the road and the number of warning signs provided during construction.* *-Location of warning signs and their effectiveness in providing road safety* *-Areas (number) with steep slopes non associated with guardrails*	*58,000,000*
18. Cultural heritage	*-The contractor and the company supervising the construction works should consider employing locals in priority*	*Avoid negative impact on population culture and spoiling remains*	*During construction*	*Number of remains reported to the authority*	*6,000,000*

	-Conduct an archaeological walkover survey. Any remains discovered during construction to be reported to the authority that will determine further actions required. The chance finds procedures as described in section 2.5.1 on point 4.Physical Cultural Resources must be observed for the duration of the contract.	*that can be found on sites and surroundings*			
19. Climate change impacts	*- Optimizing works zone traffic management: Proper traffic management practices will limit GHG emissions due to traffic congestion (i.e. minimal on project road) caused by road construction works.* *-Trucks hauling construction have lower GHG emissions.* *-Use of low roughness will reduce GHG emissions.* *-Use of modern bitumen plants that have the capacity to minimize carbon emissions.* *-Use of existing material sources, no significant green areas will be opened up. -Tree planting along the road that will be suitable for the local climate -Use of equipment in good mechanical conditions-Use surface dressing that is characteristic to the local weather conditions. Temperature: In the design, minimum and maximum temperatures should be considered should there be a temperature variation between the extremes.* *-Maintenance and repairing activities have to be planned long time in advance to avert any failures.*	*RTDA should ensure regular monitoring and maintenance of the road and its associated structures to keep them in good conditions.* *Contractor to use low emission equipment which are in good mechanical condition and regularly serviced.*	*During construction works and operation of the road*	*-Surface areas affected by climate change* *-Surface areas that need maintenance* *-Emissions of machines on site* *-Number of trees planted along the road* *-Road users with non Motorized Transport*	*24,000,000*

	-Design of road drainage storm water collection systems aligns with NAPA priority 1 / GGS on Integrated Water *-Provision of boreholes to communities and villages to increase the capacity of adaptation of villages -Replacement of rusted galvanized steel culverts with durable cement concrete culverts.* *-Design of Non-Motorized Transport (NMT) facilities in the urban sections* *-Increase local community knowledge, risks and responses to climate change*				
20. Gender aspects	*-Equal payment to men and women needs to be assured. -Households headed by women need to get additional assistance.* *-Women get employment at the same level and same payment.*	*-Gender promotion* *-Equal opportunities for men and women*	*During design and planning phase/before construction*	*-Number of women employed versus number of men employed* *-Difference on salaries for men and women and same position*	*Best practice*
21.Complementary initiatives					
1	*Training and awareness of stakeholders in Environmental protection*				*112,300,000*
	• *Environmental & Social Studies and investigations*				*2,400,000*
	• *Monitoring the implementation of the ESMP and capacity building/Hiring Environmental Expert*				*28,800,000*
	• *Training Administration staff on environmental and social management of road projects*				*14,400,000*

	• *Costs of "monitoring team and control the implementation of the ESMP*				*24,000,000*
	• *Environmental Development, equipment and preservation services/ regular maintenance of the facilities of the site for the preservation of the environment*				*12,000,000*
	• *Hiring safety/security Expert*				*14,400,000*
	• *Information and sensitization campaigns to workers, residents and road users (for security, the protection of the environment and against STDs) meetings, posters, banners, brochures, etc.*				*16,300,000*
	○ *Radio and TV spots*				*3,000,000*
	○ *Awareness panels (a metal panel 3 mx 4 m)*				*2,500,000*
	○ *Literature, brochures, banners*				*6,000,000*
	○ *Villagers debates, meetings*				*4,800,000*
2	*Construction of bus stop shelters, crops and fruits celling points*				*30,000,000*
3	*Water provision*				*31,920,000*
4	*Bread feeding points*				*37,800,000*
Sub total ESMP					*823, 256, 000*
Contingencies					*82, 325, 600*
Total ESMP					*905, 581, 600*
Total RAP					***7,169,567,018***

General total					*8, 075, 148, 018*

8.2 Environmental and Social Monitoring Plan

This monitoring program is to ensure that enhancement and mitigation measures will be covered, they produce the desired results or are abandoned or changed if they do not give conclusive results. This program has two parts:

- Monitoring during the design and construction period,
- Monitoring during the construction/decommissioning period and
- Monitoring during operation of the highway.

In essence, the implementation of the environmental management of the project will be provided by the construction companies, contracted for the road upgrading works. Environmental measures of conventional order (Personnel Security, leveling quarries and waste management) to be inserted in the specifications of works will be made by the contractor.

In addition, some players will conduct specific measures (reforest certain areas affected by the appropriate species, information, awareness, etc.): Individual consultants and NGOs with regard to the information and awareness activities; Water and Forest Service regarding afforestation / tree planting and control of fraudulent logging and poaching. The performance will be based on the schedules established for each type of work.

The control of the implementation will be mainly carried out by consultant companies (having in their team an environmental expert), with the support of some players, especially the police about the speed limit; the hydraulic services with regard to the use of local water sources; Services of Mines and Geology regards the opening, operation and career management. Environmental experts authorized by the Ministry of Natural resources will conduct the supervision and the monitoring.

The representatives of the concerned local communities for each section as well as technical services for the environment, health and safety could also participate in the supervision. The

A consultant company, who may have in the team an EHS expert, a technician or an engineer with a special environmental sensitivity, will do the permanent monitoring.

The research department must record in writing (sheets of compliance or non-compliance) orders to the environmental services, advancement and implementation according to the standards. The Engineer must also call the engineer in charge of the environment from the transport development agency if any particular environmental problem occurs.

Supervision will be made:

- From periodic checks either by construction records or through field visits,
- From the minutes of the affected communities and relevant technical services, and
- At the time of acceptance.

In case of non-compliance or non-application of environmental measures, the engineer in charge of the environment in relation to mission control, initiates the process of formal notice to be sent to the company.

8.2.1 Monitoring

It aims to ensure that the enhancement and mitigation measures proposed are actually used during the phase of reconstruction and development of the road Ngoma-Nyanza.

Monitoring criteria

Monitoring criteria are:

- Hygiene and sanitation at the campsite;
- The level of maintenance of equipment and trucks (service record);
- The use of gloves, mufflers, hats etc for the protection of personnel;
- The realization of defense works and restoration of soils, water conservation and
- Soil particularly at sensitive points in slope collapse;
- The rate of setting up temporary signs;
- The level of watering the earth embankments;
- The level of implementation of other enhancement and mitigation measures to negative impacts.

Monitoring indicators

Impact indicators to be monitored include:

- The number of claws and erosion gullies around the campsite, borrowings and quarries of storage sites,
- Turbidity and colour changes of rivers of waters. Chemical and biological analysis will be conducted with an approved laboratory (water service) to monitor potential pollution events.
- The number of consultations for waterborne disease in health centres in neighbouring regions per quarter (health service);
- The number of visits for respiratory illness, cough, bronchitis in health centres per quarter (health service);
- The number of jobs created for local workers;
- Changes in the number of accidents due to traffic disruption during construction;
- The number of signs in place;
- The number of awareness signs in place;
- The number of consultations with the political, administrative and local communities.

The analysis of these indicators is the major input of monitoring reports and the base alternative suggestions for cancellation of ineffective measures.

8.2.2 The monitoring team and Environmental Management Project

As mentioned earlier, the monitoring team and project management (MTPM) will do site supervision. Site supervision is required to optimize the technical organization of the site and the consideration of environmental issues.

Among the duties of this team, the organization of a consultative meeting before the work begins. Such consultation framework would necessarily involve all stakeholders (local elected officials, technicians from several departments, etc.) to consult on the proposed measures and to invite them to develop programs and activities within their mandate.

Also, this unit will have the task, among others:
- Further elaborate conservation areas in consultation with the villagers and help the local population to mitigate the environmental impact of the construction phase.
- Assist in the selection of the correct location of the campsite.
- Ensure the effective implementation of all the measures recommended to prevent and reduce the project's impacts on the environment.

8.2.3 Role of RTDA/MININFRA

RTDA/MININFRA will remain the sole institution that will fundamentally be responsible for undertaking monitoring throughout the project phase, when the contactor hands over the project and will be expected to ensure monitoring throughout the project phase until it gets decommissioned. Analyzing the capacity of RTDA, it was revealed the institution has different engineers that can monitor the implementation of ESMP and recommendations of ESIA. However, as per established institutional framework, RTDA relies to Rwanda Development Board for approving ESIA.
The choice of sampling sites, institutions and sample analysis conditions and use of their results, the frequency of analysis, the definition of standards and thresholds that will trigger the requirements for the implementation of the corrective actions are its responsibility.
For information, environmental and social monitoring activities for the 130 km road Ngoma-Nyanza could include:

- Monitoring the turbidity of Akagera and Akanyaru Rivers and other streams cutting the road by the provincial offices of the hydraulic during dry seasons and rainy seasons. Sample analysis should concern turbidity and salinity. In the absence of national standards, the EHS Guidelines should be used where these are more stringent, populations of protective measures will be taken whenever the situation demands.
- The Rural Engineering Service will do the soil erosion monitoring in so-called sensitive areas. This will draw on profile; finally evaluate the resistance to the landslide in the runoff effect. This analysis will be annual; it will react in time to consolidate the bank,
- Monitoring of vegetation will be conducted on the plantations. This monitoring will be permanent.
- Monitoring the health of the population in health centres by the district health services. It will be by half and will involve changes in the prevalence of STDs / AIDS, water-borne and respiratory diseases. Mastering this evolution should allow timely feedback from all authorities.
- This monitoring will also cover that of traffic accidents by the services responsible of road safety.

8.2.4 Role of Rwanda Environment Management Authority

Oversight Monitoring
As the lead agency responsible for the protection of environment in Rwanda, REMA will play the leading oversight role of monitoring the activities of the project according to the Organic Law establishing REMA and its functions.

Site Inspection Visits
REMA will undertake regular site visits to inspect and verify for themselves the nature and extent of the impacts. REMA will also undertake regular site visits to inspect and verify for themselves the extent to which the mitigation measures proposed in this ESMP are being complied with or vice versa. They will then be expected to make viable recommendations based on their findings to MININFRA.
Periodic Reports
REMA will prepare periodic environmental consolidated reports on the monitoring progress of the Ngoma-Nyanza road upgrading activities.

8.2.5 Role of the Contractor and the Engineer

Daily and Routine Monitoring
The contractor should be undertaking the major role of ensuring the mitigation measures in the ESMP are followed to the details. In actual period of rehabilitation of the road, the contactor should be undertaking regular monitoring of all the activities occurring in the project site to ensure compliance to the ESMP.
The contactor will bear all the costs related to monitoring activities during the construction or reconstruction phase of the road.
The Engineer (supervision consultant) will supervise the construction works and ensure that EHS issues are managed as per the ESMP.
The Contractor and Supervision consultant must have a full time Environment and Social Staff in place. The Engineer will provide guidance on reporting process, to whom and frequency of reports. The Engineer will supervise the contractor and ensure the ESMP is implemented on daily basis and monitoring report must be available and shared as per the monitoring frequency. A proposal of interim checklist is presented in Annexure 11.

8.2.6 Role of Government Authorities

The involvement of local authorities is crucial for the successful implementation of the ESMP. It is therefore important that the Ngoma, Bugesera, and Nyanza Districts be consulted during the implementation of the ESMP, even though they will not be very much responsible for implementing of the ESMP. One copy of this report should be sent to the mentioned districts. This is to ensure that the Districts through their respective Environmental Management Officers are involved in monitoring compliance with mitigation measures.

8.2.7 Local Communities

In general, the local communities do support the project because they benefit from the project. However, the project can obtain maximum benefit if it involves the local communities and spends a small amount of funds on the local communities. The Implementing agency should prepare and distribute a short handout, which would summarize the project, and advice whom should be contacted before and during construction. Local communities should be encouraged along the route corridor and/or project site to participate in the road project through temporary employment during construction and in the road maintenance activities during operation phase.

8.2.8 Training

The effective implementation of the ESMP requires that all persons working for the project are aware of the importance of environmental requirements for the project and their roles and responsibilities in the implementation of the ESMP. They should also be aware of the significant actual or potential environmental impacts of their work activities; the benefits of improved performance and the consequence of not complying with environmental requirements.

Whom to be trained

Thus, the following entities shall need to be trained:

o Persons with environmental responsibilities,

o Construction workers,

o Persons involved in emergency procedures,

o Senior managers.

Skills to be provided

The following skills shall need to be provided:

o Environmental monitoring – compliance monitoring and surveillance – which is the major tool for implementation of ESMP,

o Documents of Key Concern – this apart from ESMP should include other documents (E.g. ESIA report),

o Records keeping and reporting – to raise awareness in registering and maintaining records,

o Communication methods and procedures – understanding lines of communication and type of information to be communicated,

o Dealing with complaints – to maintain good relationship with stakeholders; understanding the needs, traditions and behavior of local communities.

8.2.9 Environmental hazards management

The upgrading of the Ngoma-Nyanza could entail occupational hazards/ risks and accidents especially involving motorized road construction equipment, asphalt plant and stone quarries. The following measures are proposed to control this risk:

(a) Accidents from equipment: Only trained/ certified operators would operate motorized equipment.

As per the WBG EHS guidelines, techniques for the prevention and control of these impacts include:

Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic

Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle

Ensuring moving equipment is outfitted with audible back-up alarms

Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

(b) General site hazards

As per the WBG EHS guidelines, Ngoma-Nyanza road upgrading project should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community

Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

8.2.10 Health and Safety Action Plan

Industrial injuries create a no-win situation for everyone involved. Employees experience pain, suffering and incapacitation while the company suffers from the loss of the injured person's contributions. This section presents environmental management procedures for activities with potential to cause harm to human health and the environment. The rationale is to provide a systematic approach to the manner in which environmental management shall be conducted. The section also provides a foundation for developing an Environmental Management System (EMS) for the project.

1. Objective

The general objective is to systematically establish and implement minimum SHES requirements for contractors and visitors in order to minimize non-compliances and prevent environmental and safety incidents that may be caused by contractors. In addition, it will help contractors to ensure that contractors and visitors comply with provisions of the Occupational Health and Safety rules.

2. Scope

These procedural requirements shall apply to all contractors and visitors conducting work along the Ngoma to Nyanza Road project. Major issues shall include environmental and safety best practices and all visitors and contractors have a duty to care.

3. Procedures

RTDA through its contractor is expected to integrate the procedures into the appropriate work activity and employees are expected to apply them on the job.

4. Dissemination

During construction period, contractor shall issue this plain to all his/her supervisory and management personnel.

5. Institutional Arrangements

The primary oversight to ensure mitigation actions are implemented will rest with the RTDA's Division of Development working with the Environmental and Social Unit (ESU) under Directorate of Planning, but the Rwanda Environmental Management Authority (REMA) has regulatory supervisory and monitoring roles.

RTDA shall require contractors to comply with this ESMP and assign a fulltime staff - Environmental and Safety Officer (ESO) to undertake environmental supervision during construction. RTDA confers full mandate to the supervising engineering consultant (SEC) to supervise the road project on a day-to-day basis. The SEC overseas the work of the contractor through an intermittent (not full-time) environmental specialist, this specialist should guide the contractor's fulltime Environmental Officer in undertaking his/her own responsibilities, including reporting.

6. General Procedure Requirements

1. It is mandatory for the main contractors and all sub-contractors to go through Safety, Health, Environmental and Social (SHES) induction before performing any activity or visiting any construction site.
2. After the induction, contractors shall at least be able to understand the basic SHES requirements with more emphasis on environmental and safety issues.
3. No work shall be performed by any contractor without a SHES Permit to Work which shall be approved by both the Environmental and Safety Officer (ESO) and the Resident Engineer (RE).
4. The ESO shall keep signed records of all contractors inducted and cumulative figures of the number of induction shall be reported in monthly reports.
5. Prior to performing any activity, a qualitative and/or quantitative SHES risk assessment shall be conducted and activities with high risk shall have corrective measures proposed. The risk assessment shall be reviewed by the both the ESO and RE and once approved; a copy shall be kept for future reference.
6. All contractors shall keep records of SHES incidents encountered in the past and these shall form part of the daily SHES discussion topics.
7. All the machinery for contractors shall be fit for the job and proof of fitness specifically the servicing schedule and last date serviced shall be provided before commencement of work.
8. All the machine operators shall provide proof of competence (license) to operate machinery.
9. All environmental and safety incidents under the contractor shall be reported to the RE by the **MTPM** and the contractor shall implement corrective measures.
10. Contractors working for periods of more than 30 days shall be required to submit a monthly SHES report to the RE within 7 days following the reporting period.
11. It shall be the duty of each contractor to provide the right PPE to workers.
12. It shall be the duty of contractor to ensure that their working places have met the minimum SHES requirements. These requirements shall depend on the nature of activity. Examples include hydrocarbons spillage containment facilities, adequate working space, adequate lighting, use of hazard barrier tapes where necessary and use of waste bins.

13. Working under the influence of alcohol or drugs shall never be tolerated and the ESO and RE shall conduct random alcohol tests. Refusal to be tested shall render such employees to be dismissed from the construction site with immediate effect. This rule shall apply to everyone.

14. Daily safety talks shall be conducted before start of each working day and supervisors shall keep a register of participants.

7. Specific Action Plans

a. Hazardous Waste & Fuel Management Procedures

As per the WBG Environment, Health and Safety Guidelines, the overall objective of hazardous materials management is to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their production, handling, storage and use. This objective can be achieved by:

- Establishing hazardous materials management priorities based on hazard analysis of risky operations identified through Social and Environmental Assessment;
- Where practicable, avoiding or minimizing the use of hazardous materials. For example, non-hazardous materials have been found to substitute asbestos in building materials, PCBs in electrical equipment, persistent organic pollutants (POPs) in pesticides formulations, and ozone depleting substances in refrigeration systems;
- Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion;
- Using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard;
- Implementing management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures.

b. Domestic and Commercial Waste Management Procedures

These waste types are not hazardous but they have potential to affect human health and the environment. The waste management hierarchy presented above shall apply to domestic and commercial waste.

1. Objectives

- To protect human health and the environmental from potential harm that may be caused by domestic and commercial waste.
- To comply with provisions of the Waste Management (Licensing of Transporters of Waste and Waste Disposal Sites).
- To comply with the general guidelines provided under the National Solid Waste Management Strategy.

2. Scope

The procedures cover generation, storage, transportation re-use and disposal of domestic and commercial waste.

3. Procedure Requirements

1. Waste separation at the point of generation shall be a fundamental activity and appropriate signs shall be painted on waste bins to facilitate separation.
2. Biodegradable waste shall be collected in waste bins and dumped at the landfill, which shall be created within the mine area and licensed with REMA.
3. Domestic waste bins shall be distributed at appropriate places and these shall be labeled for waste disposal. Bin-liners shall always be provided to avoid double handling.
4. A "Please No Littering, Use Waste Bins" sign shall be installed at the gate to remind everyone entering the construction camp that littering is not acceptable.
5. Weekly records of biodegradable waste bins collected shall be kept by the head of housekeeping and these shall be reported in monthly reports.
6. The waste should be taken to registered and approved landfill site
7. All the salvageable material shall be kept within a salvage yard, which shall be created within the camp. The material that shall be kept in the salvage yard shall include used tires, scrap metal and any material that can be re-used or sold.
8. Wood waste from workshop shall be stockpiled at the kitchen and used as firewood.

Records of the commercial waste and domestic waste generated per month shall be kept by the ESO and these shall be reported in monthly reports.

c. Environmental Safety Emergency Response Procedures

Considering environmental aspects associated with the project, major emergencies may arise from explosives, fuel, and spillages of hazardous waste; dump wall collapsing or pit collapsing.

1. Objectives

-To protect human health and the environment from environmental emergencies.
-To comply with provisions of the Rwandan legal requirements such as the Occupational Health and Safety.
-Contact the REMA, Hospital, Police and Fire Brigade on the emergency call numbers.

2. Scope

The scope is limited to environmental and safety emergencies that may occur as a result of the proposed road construction related activities.

3. Emergency response procedures

1. All hazardous substances shall be handled with spills response facilities available, appropriate protective clothes, an emergency shower in proximity to the storage facility, first aid box and fire extinguisher.
2. Conduct an incident investigation as soon as possible and report findings to the ESO for future preventive measures.
3. Conduct follow-up activities.
4. Do not dispose of any cleanup waste into aquatic environments or terrestrial ecosystems. These should be left at the emergency scene for treatment or collection for appropriate disposal.

5. Implement cleanup measures as described in the MSDS or as advised by ESO.
6. Implementation of prevention measures should be done immediately the cleanup is complete.
7. Report all emergences immediately they occur to the ESO.
8. Report all safety emergencies and near misses to the ESO who shall in turn report appropriately to top management and government institutions.
9. Restrict access to an environmental incident area immediately an environmental emergency occurs.
10. Review the emergency after completion of remedial measures to identify what went wrong and take note of mistakes that led to the immanency.

d. Record Management and Authentication Procedures

1. Objectives

Record keeping is the only way to prove that an activity was performed. Good record keeping provides a good defense platform in case of litigation and proves transparence and good will for SHES activities. Specific objectives for the Record Management Procedure are:
-To facilitate cross-referencing and review of past performance for future improvement.
-To facilitate use of procedures approved by management thereby indicating top management commitment and authority.
-To give a tracking system for evaluating environmental performance.

2. Scope

The scope of the "Record Management Procedure" includes all SHES related documents such as, but not limited to operating procedures, environmental management standards, legal register, statutory reports, incident reports, external correspondences and environmental permits.

3. Procedure Requirements

1. Approval of documents: - The ESO shall present the procedures in this report for approval by RE after adding the necessary document control information. This may be done with assistance from an external consultant.
2. Document Custody: - All the SHES documentation shall be kept by the ESO using an appropriate filling system with the document version number and reference number. The ISO 14001 document control system shall be adopted.
3. Distribution: - Only signed documents shall be distributed for use to respective employees. These documents shall be distributed as hard copies or scanned electronic copies.
4. Review: - All the procedures shall be reviewed annually and all reviews shall be initiated by the ESO every first month of the year.
5. Document Identification: - For purpose of efficiency and continued improvement, the ISO 14001 document referencing system shall be adopted.
6. Inspections and Monthly Reports: - Inspections and monthly reports shall be referenced and hard copies printed for authentication by the RE. These shall be kept by the ESO for future reference and external auditing purposes. They shall also provide proof of environmental management performance.

6. Checklists: - Inspection checklists shall be developed for all forms of inspections in order to conduct these inspections in a systematic manner. The inspection checklists shall be reviewed and kept by the ESO. These checklists shall always be used to show proof that an inspection was conducted and follow-ups made.

8.2.11 Grievance Redress Mechanism

A mechanism will be established to address all grievances that will be raised cause of the implementation of the project through its different phases. In addition to grievances related to non-fair compensation, others could be related to the different negative impacts that we have listed above and that need to be mitigated. It is therefore to set up a Grievance Redress Committee that will in charge of redressing the grievances (details in annexure 4)

Table 8-3: Environmental and Social Monitoring Plan

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			Positive impacts		
1. Income, livelihood and employment	*Just before construction*	*Weekly*	*-Number of persons employed* *-Number of local employees* *-Number of women employed* *-Number of children employed*	*Local Government* *RTDA* *Districts*	*Local Government* *RTDA*[31]
2. Pedestrian traffic	*During operation*	*Monthly*	*-Number of accidents on pedestrians*	*Local Government* *RTDA* *Districts*	*Local Government* *MTPM*
3. Transport	*During operation*	*Monthly*	*-Number of road users*	*Local Government* *RTDA* *Districts*	*Local Government* *MTPM*
4. Increased Economic Activity	*During construction and operation*	*Monthly*	*-Frequency of maintenance activities* *-Number of residents involved in economic activities*	*Local Government* *RTDA* *Districts*	*Local Government* *MTPM*
4.1 Agriculture and Livestock	*During construction and operation*	*Monthly*	*-Growth of agro-pastoral production*	*Local government* *Districts*	*Local Government* *MTPM*
4.2 Trade/ Industry	*During operation*	*Monthly*	*-Growth rate of the volume of trade in goods and travelers*	*Local Government* *RTDA* *Districts*	*MTPM* *Local government*

[31] **Monitoring and Project Implementation Unit**

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			-Number of SMEs / SMIs installed		
4.3 Tourism and cultural activities	During operation		-Statistics of tourist arrivals and cultural activities	Local government RDB Districts	Local government RDB
4.4 Craft	During operation	Monthly	-Growth of craft production	Local government RDB	MTPM Local government
5. Living conditions of women and vulnerable groups	During construction and operation	Monthly	-The number of projects initiated for women -The number of projects/activities initiated for vulnerable groups including women -Number of micro projects implemented	Contractor RTDA Districts	MTPM Local government
6. Safety and security	During construction and operation	Daily	-Presence (frequency) of police officers along the road -Number of accidents on the road per period of time. -Number of signs warning motorists missing on appropriate locations -Traffic safety awareness programmes	Contractor Traffic Police RTDA Districts	Engineer MTPM Traffic Police

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			(number per period of time)		
7. Drainage and its environmental benefits	*During construction*	*Weekly*	*-Percentage of Sides of drainage channels planted with grass or stone pitched* *-Percentage of drainage systems with scour checks*	*Contractor* *RTDA*	*Engineer* *MTPM*
Negative impacts					
1.Loss of land and assets	*Before construction*	*Daily*	*-Number of PAPs compensated versus not compensated* *-Areas restored after construction and areas not restored* *-Number of complains on expropriation* *-Number of PAPs not compensated after the start of construction* *-Landtake from the boundaries of Gako military domain, Akanyaru and Akagera wetlands*	*Local government* *RTDA* *Districts*	*Local government* *MTPM*
2. Crops damages and trees cutting	*During design and planning phase/before construction*	*Daily*	*-Designed drains with outlets* *-Number of trees to be*	*Local government* *RTDA* *Districts*	*Local government* *MTPM*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			cleared *-Number of trees replanted*		
3. Erosion and pollution	*During construction*	*Weekly*	*-Water flow with the drainage structures* *-Water quality monitoring of the nearest river* *-Number of construction structures for drainage and soil erosion* *-Amount of sediments in affected water bodies* *-Oil, fuel and lubricant spillage*	*RTDA* *Contractor* *REMA*	*Engineer* *Contractor* *MTPM*
4. Impact on vegetation	*During construction and operation*	*Weekly*	*-Number of trees planted* *-Number of trees replanted/compensated and not replanted/compensated* *-Number of indigenous species* *-Vegetation lost in the buffer zone and restored elsewhere (ha)*	*RTDA* *Contractor* *REMA* *Districts*	*Engineer* *Contractor* *MTPM*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
5. Hydrology and drainage	*Construction*	*Weekly*	*-Maintenance of recharge and quality of aquifers, water quality and quantity in surface waters*	*RTDA* *Contractor*	*Engineer* *Contractor* *MTPM*
6. Water Resources and wetlands	*When the construction works start and during construction*	*Weekly*	*-Amount of construction debris on site (m3)* *-Non adequate hydrocarbon storage (m3)* *-Compliance with water quality standards* *Sheets laboratory* *-Report of receipt of drilling works* *-Flooding events through wetlands (number)* *-Areas of wetlands and buffer zones encroached by project activities* *-Water flow through water ways (m3/s)* *-Frequency of solid and liquid waste collection*	*RTDA* *Contractor* *REMA* *Districts*	*Engineer* *Contractor* *MTPM*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			and disposal (Nber/week). *-Vehicle maintenance record, review plans for waste management and oil handling practices*		
7. Flora	*Before and after construction*	*Weekly*	*-Areas cleared with vegetation and non required for widening, operation and maintenance* *-Vegetated areas non removed by mechanical means* *-Areas cleared selectively* *-Number of groves and street trees planted* *-Number of native bamboos and other native tree species planted*	*RTDA* *Contractor*	*Engineer* *Contractor* *MTPM*
8. Fauna	*Before and after construction*	*Weekly*	*-Number of recorded vehicle collisions* *-Number of wildlife species attracted to untidy campsites* *-Number of personnel*	*RTDA* *Contractor*	*Engineer* *Contractor* *MTPM*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			reported hunting, fishing or harassing wildlife *-Number of people trained on disturbance of migratory birds* *-Number of areas marked for migratory birds*		
9. Air quality	*When the construction works start, during construction and operation*	*Daily*	*-Amount of dust emitted at sensitive areas* *-Quality of air on sites and in the surroundings* *-Quality of air emitted by construction vehicles*	*RTDA* *Contractor* *REMA* *Districts*	*Engineer* *Contractor* *MTPM*
10. Labor camp and influxes	*When the construction works start and during construction*	*Daily*	*-Number of areas with open water left or standing water* *-Number of equipment not in good conditions* *-Number of HIV facilities including condoms distributed on site* *-How many awareness campaigns were*	*RTDA, Contractor* *Ministry of Health (MoH)* *Districts*	*Engineer* *Contractor* *MTPM* *Ministry of Health (MoH)*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			conducted on sexual abuse and prostitution in general and related to children under 18 *-How many workers and people were mobilized, informed and educated on sexual abuse of children* *-Number of cases of malaria and other diseases* *-Number of available condoms* *-Number of information posters* *-Number of personnel protective equipment on site, use and condition of PPE* *-Labor influx (number/period of time)* *-Number of locals employed* *-Number of grievances handled and not handled*		

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			-Number of employees trained and not trained on code of conduct and enforcement of laws		
11. Surface runoff and soil	*During construction and operation*	*Weekly*	*-Areas eroded (sm) and runoff (mm) in the zone* *-Slopes reforested* *-Frequency of irrigating young plantation during dry season*	*RTDA* *Contractor* *Districts*	*Engineer* *Contractor* *MTPM*
12. Noise and vibration	*During construction and operation*	*Daily*	*-How often the neighboring is informed in case of unusual construction activities* *-Noise level (dBA)* *-Number of blasting events*	*RTDA* *Contractor* *REMA* *Districts*	*Engineer* *Contractor* *MTPM*
13. Solid waste management	*During construction and operation*	*Daily*	*-Amount of waste (kg or m3) in the demarked waste collection area* *-Spoil disposed on non approved locations (m3)* *-Solid waste regularly*	*RTDA* *Contractor* *Districts*	*Engineer* *Contractor* *MTPM*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			collected from the campsites *-Solid waste daily stored in the campsites (m3)* *-Amount of waste retained in the roadside drains* *Number of signposts warning on dumping in natural habitats* *-Amount of waste monthly dumped in the natural habitats or along the natural habitats* *-Frequency of stop over or camping in portions of road crossing the natural habitats* *-Number of parking yards, bus bays and footbridge landings authorized in the portions of road crossed by the different vehicles.*		
14. Landscape and panoramic view	*After construction*	*Monthly*	*-The number of trees planted*	*RTDA* *Districts*	*RTDA* *Local government*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
15. Quarries and gravel pits	*During construction and right after construction*	*Weekly*	*-Number of quarries and material sites not rehabilitated* *-Number of borrow pits and quarries with no permits and being operated* *-Absence of open water that can be used by breeding mosquitos*	*RTDA* *Contractor* *Districts*	*Engineer* *Contractor* *MTPM* *Local government*
16. Access to homes and institutions	*During construction*	*Daily*	*-Flow of vehicles along the road and especially through the construction sites (km/h)* *-Delay when crossing different areas and construction sites (hours)* *-Time with absence of crossing*	*RTDA* *Contractor* *Districts*	*Engineer* *Contractor* *MTPM* *Local government*
17. Mobility and road safety	*During design and construction*	*Weekly*	*-Number of road signs planned to be installed along the road and the number of warning signs provided during construction.* *-Location of warning signs and their*	*RTDA* *Contractor* *Traffic Police* *Districts*	*Engineer* *Contractor* *MTPM* *Traffic Police*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			effectiveness in providing road safety *-Areas (number) with steep slopes non associated with guardrails*		
18. Cultural heritage	*During construction*	*Weekly*	*-Number of remains reported to the authority* *-Number of trainings for chance finds provided ;* *-Presence of screens or shields to avoid impacts to cuturally sensitive sites.* *-Grievances reported to the Project staff on cultural heritage objects.*	*RTDA* *Contractor* *Districts*	*Engineer* *Contractor* *MTPM* *Contractor*
19. Climate change impacts	*During construction works and operation of the road*	*Weekly*	*-Surface areas affected by climate change* *-Surface areas that need maintenance* *-Emissions of machines on site* *-Number of trees planted along the road* *-Road users with non*	*Contractor* *RTDA* *Districts*	*Engineer* *MTPM* *REMA*

Impacts	*Implementation period*	*Frequency*	*Monitoring Indicators*	*Responsibility*	*Monitoring structures*
			Motorized Transport		
20. Gender	*Construction and operation*	*Weekly*	*-Number of women employed versus number of men employed* *-Difference on salaries for men and women and same position*	*Contractor* *Local government* *RTDA*	*Contractor* *Engineer* *Local government* *MTPM*

8.3 Implementation arrangements

The implementation of the environmental and social management plan (ESMP) will be provided by:

1.Monitoring Team and Project Management (MTPM).

2.Rwanda Environment Management Authority (REMA) whose the mandate is the management of the ESIAs

3. District officers for environment and infrastructure. REMA can't monitor different projects scattered in different areas of the country. In the same context, REMA can't attend all public consultation meetings organized out off Kigali. Therefore district environmental officers were deployed at district level and offices to represent REMA and report on different environmental issues that can occur in a specific district.

4.The environmental team shall be monitoring the implementation of the ESMP. This team is formed by a representative of the client with the support of an environmental expert. They jointly seek solutions to specific problems and propose alternatives for non-efficient measures. This team will conduct quarterly monitoring missions on sites. It will provide the Monitoring and project implementation with a quarterly report on the state of implementation of mitigation and enhancement measures recommended for specific impacts, emerging problems, solutions and any other useful and necessary recommendations.5. Contractor will be responsible for adherence to the mitigation measures to ensure full compliance with the ESMP. The Contractor should also take all other measures required by the Engineer to prevent harm, and to minimize the impact of his operations on the environment. The Contractor and Supervision consultant must have a full time Environment and Social Staff in place.

6. The Engineer (supervision consultant) will supervise the construction works and ensure that EHS issues are managed as per the ESMP. The Engineer will provide guidance on reporting process and frequency of such reports. The Engineer will supervise the contractor and ensure the ESMP is implemented on daily basis and monitoring report must be available and shared as per the monitoring frequency.

9. Conclusion and Recommendations

9.1 Conclusion

The proposed Ngoma-Nyanza road project has actively involved the key stakeholders who did not object the development. No serious and adverse objections were received from the communities occupying the entire Ngoma-Nyanza road alignment. The road will lead to economic improvement to people living along the road profile and surrounding region. It is therefore considered suitable for the local area.

The upgrading of the Ngoma-Nyanza Road to bitumen is an important project that has great benefits including facilitation of trade, education, health, reduction in travel times, improvement of income for the local communities through trade and employment. However, the ESIA study has illustrated that the upgrading of the Ngoma-Nyanza Road will be realized at an environmental and social cost.

The proposed Ngoma-Nyaza road construction and widening project will have adverse impacts in terms of activities that will require resettlement of the local communities living or utilizing the land for different reasons in the selected project area. In regards to this project, 312 residential houses, 2 churches, 4 schools, 4 health centres and 1 market will be partially or totally affected by the project.

The project aims to upgrade an existing road and no diversions were proposed. The 3 to 7 meters earth road (major part) will be widen to 15 meters. The road crosses three different sensitive natural habitats, namely Akagera wetlands, Akanyaru wetlands and Gako military domain.
Gako military domain is not a national park and Akagera Park is not to be affected by the project as it is far to be in the zone of influcence of the project.
Akanyaru wetland is an important bird area with ICUN bird species. It is a home of CITES birds and mammals species while Akagera wetland is home of important plant species. Specific mitigation measures have been proposed to minimize impacts on these sensitive ecosystems. Ecological function of the two wetlands and Gako military domain are important to sustain the rich ecosystem in the project zone of influence. Encroached wetlands buffer zones must be restored.

The study showed that the environment and social contexts will be interfered with in varying magnitudes such as through erosion; loss of trees; possible disturbance to natural habitats and pollution of water; proliferation of communicable diseases and many other negative impacts. The study has therefore proposed several mitigation measures to control reduce or reverse the perceived impacts. It has also proposed implementation and monitoring mechanisms of the environmental and social management plan.

9.2 Recommendations

The ESIA study recommends timely implementation of the World Bank EA category B project with strict adherence to the proposed Environmental Management and Social Management Plans. The project benefits have been identified to far outweigh the negative impacts for which a mitigation plan has been prepared. Further, the proponent has carefully considered and applied acceptable local and international standard/regulations at all stage of project planning and would thus qualify for Environmental Compliance Certificate before its implementation.

Following the impact analysis presented in the previous sections, here below are the recommendations proposed to be delivered as part of the project:

- The Proposed project to be implemented in compliance with the relevant legislation and planning requirements. The proponent must ensure that the impacts are kept to a minimum acceptable level.
- The project should be implement in a context within witch it improve the Social and Economic status of the influence area by opening up the area to the market for available goods and services. The project should also lead to spurring economic and social development by providing vital links between trading centres and enhance people's access to employment, and a wide range of social services including health centres, education, administrative headquarters and others.
- The acquisition of the land and private properties will be carried out in accordance with Rwanda Expropriation law for public interests, World Bank OP 4.12, RAP and entitlement framework for the project.
- The road crosses three natural habitats, it is important activities that will create significant disturbances to the environment be avoided or kept to a minimum around areas with wildlife and birds. Such activities include clearing of vegetation, traffic diversions, haulage routes, workmen's camps and chemical spills.
- The contractor should ensure minimum vegetation is cleared in the wetlands buffer zone and a structure should be erected to protect the wetland from contamination. Regularly clear invasive species and avoid dumping all king of waste along the road and in the natural habitats crossed by the road as this may increase the proliferation of these invasive species
- If any impact undertakes restoration of habitats through restoring the buffer zones and planting indigenous trees
- Further as long-term mitigation measures, the habitat enrichment activities such as planting of native bamboos, other native tree species will be carried out. Environment Specialist in collaboration with Wildlife Conservator will determine the suitable plant species for wildlife habitat enrichment and these should be built into the project design. There will be strict compliance monitoring by Environmental Specialist while constructing road through Reserve Forest area.
- Infrastructures shall be built to be resilient with extreme events. Consider increasing embankment in different areas with lower levels and areas that have already been affected by different floods events. The design of the bridges must take into consideration these water fluctuations and the characteristics of different floods like the highest water level

attained during a flood event. It is also important to make sure there is no misalignment of the road and the bridges as it could itself cause failure of the bridges or create flooding around the bridges or along the road.

- -Scale up road safety, environmental and HIV-AIDS campaigns awareness since road upgrading activities, improved human mobility and income on the transport sector especially go in tandem with increased accidents, HIV transmission and environmental negative impacts.

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Annexes

Annex 1: Environmental checklist

This environmental checklist was prepared as a standard lists of the types of impacts associated with this particular type of project. The method is a primarily for organizing information or ensuring that no potential impact is overlooked. It comprises list of questions on features the project and environments impacts. It is generic in nature and was used by the consultant as aids in assessment. The checklist can also be used by the developer and contractor as aid through the different phases of the project.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process?	(a)Y	(a) EIA and RAP reports were prepared and are to be officially submitted to RDB
		(b) Have EIA reports been approved by authorities of the host country's government?	(b)N	(b) The reports are not yet approved and are under review by the developer.
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	(c)N	(c) The reports are always approved under conditions. In actual context we cannot say if the conditions are satisfied
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(d)N	(d) No other environmental permits were obtained
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?	(a)Y	(a) Contents of the project and potential impacts were explained to the stakeholders through appropriate disclosure and procedures, but understanding most of the time depends on level of education
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the	(b)Y	(b) Comments of the stakeholders were considered and reflected in project design

		project design?		
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a)Y	(a) Alternative plans were examined with social and environmental considerations but also cost benefit analysis of a specific plan
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources; such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	(a)Y (b)N	(a)Ambiant air quality will comply with acceptable international standards as there are no specific national standards. Mitigation measures proposed include the following: -Planting trees in the road reserve help to filter out particulate matter emitted from exhaust fumes and dust. -Speed controls e.g. by temporary speed pumps on diversions where necessary (b). There are no industrial areas near the route, so no possibility to make the pollution worse
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater?	(a)Y (b)Y	(a)Yes there is such possibility. (b)Yes, there is such possibility.

		(c) Do effluents from various facilities; such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards?	(c)Y	(c)There is a possibility of non compliance, monitoring is strictly recommended
	(3) Wastes	(a) Will the wastes generated from the project facilities, such as parking areas/service areas, be properly treated and disposed of in accordance with the country's regulations?	(a)Y	(a) The project activities have not started yet. Mitigation measures proposed will ensure wastes are appropriately collected and treated as per country's regulations
	(4) Noise and Vibration	(a) Will noise and vibrations from the vehicle and traffic be complied with the country's standards?	(a)N	(a) Compliance with international acceptable standards.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a)N	(a) The project crosses three important natural habitats. The road is an existing one and mitigation measures were proposed to ensure these protected areas are not impacted
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of IUCN/CITES species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(a)N (b)N (c) Y	(a) The project crosses three important natural habitats. The road is an existing one and mitigation measures were proposed to ensure these protected areas are not impacted. (b) Yes, the proposed project sites shall encompass such areas. It is an existing road with possibility to mitigate impact on those natural habitats. (c) To conserve, preserve and restore ecosystems and maintain ecological and systems functioning, which are life supports, particularly the conservation of national biological diversity;

				optimum utilization of resources and attain a sustainable level of consumption of resources;
		(d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock?	(d)Y	(d) Appropriate protection measures were recommended
		(e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?	(e)Y	(e)-Such impacts can be caused but related mitigation measures were proposed.
		(f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	(f)Y	(f)• Yes, there is such possibility if mitigation measures are not strictly implemented. Areas requiring selective clearing (i.e., buffer zones, sensitive sites) shall be marked prior to clearing. The Contractor or a designate will supervise the equipment operators to ensure these areas are not missed or unduly disturbed by construction equipment and related activities.
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a)N	(a) Such possibility is not anticipated

	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a)N (b)N (c)Y	(a) It is possible that landslides can occur. Appropriate mitigation measures were proposed. (b) No such expected impact and so no mitigation measures. (c) Yes, it is possible, appropriate mitigation measures were proposed.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular	(a)Y (b)Y (c)Y (d)Y (e)Y (f)Y	(a) Yes, project implementation will cause involuntary resettlement. Efforts were made on the design and sizing of the road components (b) Yes, preliminary explanations were given. It is a continuous process (c) Yes. It was developed (d) As required by the Expropriation Law and WB related Operation Policy.

		attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(g)N (h)N (i)Y (j)Y	(h) The RAP implementation will follow chronological steps, which include the agencies/committee or institution responsible for each activity. The total number of days for the grievance to be solved is 30. The RAP Operationalization includes accompanying measures for all PAPs and for vulnerable PAPs, measures related to Transition compensation, physical and economic displacement. (i)-Those affected will be compensated according to the official compensation rates. -Compensation Committee coordinating efforts. -PAPs have been paid in full and before implementation of the sub project activities; -Covering the side drains with concrete blocks and use these blocks as pathways and buffer area between the road and surroundings - Economic rehabilitation measures have been implemented; (j)A Grievance Redress Committee will be established in project-affected areas. The composition of the grievances handling committees is proposed as indicated in section Further to this the Expropriation law will be used as the supreme guide in matters that relate to grievance handling if they cannot be handled at the committee level.

				The Law stipulates that the dissatisfied person has a period of 30 days after the project approval decision has been taken to appeal (Article 19). The first step of redress is to inform those to be expropriated of their rights during the expropriation process. Articles 17-20 of the Expropriation Law obliges the representative government authority (that which is implementing the project requiring expropriation) to inform affected people of their rights at each stage of the process.
	(2) Living and Livelihood	(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the	(a)N (b)N (c)Y (d)Y	(a) No mitigation measures (b) -Those affected will be compensated according to the official compensation rates. -Compensation Committee coordinating efforts. -PAPs have been paid in full and before implementation of the sub project activities; -Covering the side drains with concrete blocks and use these blocks as pathways and buffer area between the road and surroundings (c)-Scale up HIV-AIDS campaigns awareness -There is need to control haphazard un-planned development of commercial activities Work to minimize or altogether eliminate mosquito-breeding sites.

		surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that roads will impede the movement of inhabitants? (f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	(e)Y (f)N	-Ensure that all equipment are in good working conditions -Intensify awareness creation on malaria and HIV/AIDS prevention. -Provision of condoms through dispensers located strategically at all workstations. -Provision of information posters. -At the sub-project level, the district authorities will have responsibility for ensuring monitoring is undertaken with the Resettlement and -Compensation Committee coordinating efforts. (d)～(f)Please eplain some mitigation measures taken during the project if any
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a)N	(a)-The contractor and the company supervising the construction works should consider employing locals in priority -Conduct an archaeological walkover survey. Any remains discovered during construction to be reported to the authority that will determine further actions required.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a)Y	(a)• Limit and direct the operation to perform operation "hollow tooth" • Adapt the surroundings career (entrance to the site access road) with some contributions in topsoil and plantations. • As for the massive rock quarries, they have intrinsic landscape quality due to the configuration, appearance and color of the rock. It is conceivable to use the site into a tourist attractive place and highlighting the working face. For an attractive value to the public future operations will have to leave: • Harmonious and diverse sculptural forms; • Contrasting shapes and atmosphere;

	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a)N (b)Y	(a)-The contractor and the company supervising the construction works should consider employing locals in priority. Avoid negative impact on population culture (b Respect, conserve and maintain [the] knowledge, innovations and practices of indigenous and local communities The Project will benefit both indigenous workers and migrant workers
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country, which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment, which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a)N (b)Y (c)Y (d) Y	(c)• Potential accident hotspots shall be marked with appropriate road signs. • Road design shall provide signs warning motorists about pedestrians and animals on the road. • Speed control provisions such as humps will be installed near schools and approaches to trading centres or large settlements. • Traffic safety awareness programmes shall be conducted both during construction and use of the road. Training will target teachers (who should train pupils), health workers, public transport drivers and police. The training will focus on elements of road safety namely: engineering, environment and awareness. The training is expected to last over the entire construction period as provided below: • Once every 2 months: Training for 100 people from categories: teachers, health workers, public transport drivers and police, and provide them with requisite information packs such as brochures. • Once every quarter: Print information packs such as brochures or posters to be used in next

				training and for display in schools and public places (taxi parks, hotels). • Twice every month (in 1st and 4th week of each month): Announcements will be made on local radio stations about road safety targeting pedestrians, school children, taxi and bus drivers and motorcycle cyclists.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a)Y (b)Y (c)Y	(a)-Inform the neighbouring communities of any unusual construction activities -Undertake structural integrity assessment of existing buildings and other structures along the road as control for damages from vibrations -Utilize low noise machinery for the construction to the extent possible (Noise levels be below 70dBA to the nearest receptors by days). -Undertake assessment of building structures within the work areas with respect to their capacity to withstand compaction vibrations. -Limited blasting for hard stone quarries shall only be done after approval by the relevant authorities and also effective public information. -Provide all construction workers with relevant safety gear -Working at night within settled and built up areas will be upon issuance of necessary permits -In the eve-Dust emissions may be partially controlled by keeping diversions and dust prone areas -Asphaltic batch plants need to be sited as far as possible from residential areas. -Regular dust collection, removal and water sprinkling at the asphalt mixing and cement stabilization yards. -Monthly maintenance of asphalt and stabilization

				plants. -Surface dressing of diversions through population centers. -Proper maintenance of vehicles and machinery -Construction activities will be scheduled carefully -Nighttime's uses of certain noisy machines, such as pile drivers and concrete vibrators, regulated. -Establishing a legal system where fines are imposed on offenders. -Planting trees in the road reserve help to filter out particulate matter emitted from exhaust fumes and dust. -Speed controls e.g. by temporary speed pumps on diversions where necessary -As much as practical cover the material stock piles to reduce dust -Use protective clothing like helmets and dust masks on construction crew. -Speed control provisions such as humps will be installed near schools and trading centres or large settlements. -Enforce regulations against procurement, sale and use of fuels not meeting current fuel specifications. nt of commercial sources of materials, the Contractor should encourage influence due diligence.

	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a)Y (b)- (c)Y (d) Y	(b)(c)The monitoring team and project management (MTPM) will do site supervision. The latter will be used to optimize the technical organization of the site and the consideration of environmental issues. This cell will be composed of: - A representative of the Ministry of Infrastructure, - A representative of the Ministry of the Environment - Environmentalist from the mission in charge of supervision Among the duties of this cell, the organization of a consultative meeting before the work begins. Such consultation framework would necessarily involve all stakeholders (local elected officials, technicians from several departments, etc.) to consult on the proposed measures and to invite them to develop programs and activities within their mandate. Also, this unit will have the task, among others: - Further elaborate conservation areas in consultation with the villagers and help the local population to mitigate the environmental impact of the construction phase. - Assist in the selection of the correct location of the campsite. - Ensure the effective implementation of all the measures recommended to prevent and reduce the project's impacts on the environment. This monitoring program is to ensure that enhancement and mitigation measures will be covered, they produce the desired results or are abandoned or changed if they do not give conclusive results. This program has two parts: - Monitoring during the construction period and

				- Monitoring during operation of the highway. In essence, the implementation of the environmental management of the project will be provided by the construction companies, contracted for the rehabilitation works. Environmental measures of conventional order (Personnel Security, leveling quarries and waste management) to be inserted in the specifications of works will be made by the contractor. In addition, some players will conduct specific measures (reforest certain areas affected by the appropriate species, information, awareness, etc.): (d) frequency and Monitoring period are provided in the Environmental and Social Monitoring Plan
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).(b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) N(b) N	(a)-(b)-
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a)N	(a)-

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.

In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries
(Including World Bank's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Annex 2: Lists of participants to public consultation meetings organized at district level

Bugesera, 9th August 2016.

LISTE Y'ABITABIRIYE INAMA YO KUWA 09/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N⁰	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
1	Turiyeyimana J de Dieu	SLM Nyamugenge	0785141131	[signature]
2	Eng. Nyandwi Noël	SLM Ngeruka	0788222363	[signature]
3	INGOBOKE M. Grâce	BDE / Ruhuha	0788671536	[signature]
4	UMURERWA Claudine	SLM / GASHORA	0785352925	[signature]
5	UWAYEZU Emmanuel	Road Development & Maintenance Engineer	0788816936	[signature]
6	HABYARIMANA Paul	REG / EUCL	0788360207	[signature]
7.	UMUHOZA Adelite Christian	Director OSC	0788748260	[signature]
8.	Ntahokaja Magalie	Eco-Design	0789868848	[signature]
9.	MBONABUCYA Gerard	ECO-DESIGN.	0788232154	[signature]
10	Celestin HAKORIMANA	RTDA	0787763670	[signature]
11	CSP Anselme AHIMANA	D/TRG – TRS / RNP	0788456099 311356	[signature]
12	Cyprien NDAYISABA	RTDA	0788460491	[signature]
13	MWAWANIMBABAZI Oscar	E/S of Kamabuye sector	0788569188	[signature]
14	KARUGWIRO Antoinette	Ag E/S Nyarugenge sector	0787777958	[signature]

Bugesera, 8th August, 2016

LISTE Y'ABITABIRIYE INAMA YO KUWA 09/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N°	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
15	MUKIZA Olivier	Etat civil/Ruhuha Sector	0788648312	
16	UGIRINGOGA RASONGA Emmanuel	Etat civil: Ess. aui NGERUKA	0784306777	
17	NZABURAMBAHO Valens	District Electrical Engineer	0788133517	
18	MUSHENZI Innocent	AF-E/S GASHORA Sector	0784484757	

Ngoma 19th August 2016

LISTE Y'ABITABIRIYE INAMA YO KUWA 09/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N⁰	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
1	RWIRIRIZA J.M. Vianney	V/Mayor Fed / NGOMA	0788522524	[signature]
2	UHORANANGOGA Vincent	Corporate Division Manager	0788413998	[signature]
3	MUGISHA Arcade	RFR Engineer/NGoma	0788827387	[signature]
4	BAYINGANA Joseph	Coordinateur w'urubyiruko of Sector	0783381936	[signature]
5	A. Didace Mutuzi	Padiri Mukuru wa Paroisse Kibungo	0788572552	[signature]
6	A. Pierre Célestin AKINGENEYE	Curé de la Paroisse RUKOMA	0784900000	[signature]
7	Nkusi Emmanuel	Umuyobozi wabitorera	0788868178	[signature]
8	NDUWIMANA François	President w'Inama Njyanama/SAKE	0788410199	[signature]
9	MUREBWAYIRE Elisabeth	Umuhuzabikorwa wa CNF GASHANDA	0781970720	[signature]
10	Mukaromi Césarie	Umuhuzabikorwa wa C.N.F Rurenge	0782927008	[signature]
11	RURANGIRWA Shabani D.E.V	SEDO / KAZO	0788568788	[signature]
12	Mzee MUNANA Jonathan	Uhagarariye EAR Sub-Parish Karama	0785512368	[signature]
13	BUTERA Eric	Land Manager / Rurenge Sector	0788683116	[signature]
14	Niyigena Alexis	E/S Gashanda (or)	0783373798	[signature]

15. MUKAYIRANGA Gloriose E/S Sake Sector 0783225372 [signature]
16. Nyiransabimana Alexia CNF Rukumberi 0783150792 [signature]
17. Mukawerimana Josiane CNF Karama 0723238587 [signature]

Ngoma 9th August

LISTE Y'ABITABIRIYE INAMA YO KUWA 09/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N⁰	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
15	KANUMA Aimable	Pasteur AEBR	0783253062	[signature]
16	HABYARIMANA [illegible]	REG / EUCL	0788450207	[signature]
17	CSP Anselme AHIMANA	D/TRG-TRS / RNP	0788456099 311356	[signature]
18	MBONIMPUGA Gerard	ECO-design Consultant	0788232154	[signature]
19	Magalie Ntahokaja	Eco-design	0782865846	[signature]
20	Cyprien NSAYISABA	RTDA / Environmental Specialist	0788460491	[signature]
21	Kanyonga [illegible]	BDE	0788810162	[signature]
22	MUKUNDWA N Denis	UR/KIBUNGO CAMPUS	0788468121	[signature]
23	HAKORIMANA Celestin	RTDA	0788763367	[signature]
24				
25				
26				
27				
28				

11/08/2016 Nyanza

LISTE Y'ABITABIRIYE INAMA YO KUWA 11/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N°	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
1.	Egide KAYIGIRA	Opinion leader.	0788871864	
2.	KAYONGA Erasme	Student / one stop Center NYANZA	0769611424	
3.	Jean pierre TWAGIRAYEZU	Uwunganizi kumukana	0783264699	
4.	NIYAKIRE Innocent	chef de village NYARUBUNGA	0722845358	
5.	KALINDA Alexis	Pastor (SDA) Kigoma	0788618850	
6.	MUBERA Elie	Umukarani Umudugudu	0788812467	
7.	Rukizendenga Isaac	chef de village Nasangano	0786093302	
8.	Nkundigera Selemani	Chef. umudugudu Butare Kigoma	0786093875	
9.	KATIRANGA ALEXIS	CHEF UMUDUGUDU KINIGA	0786095659	
10.	Karekezi Elosto	Chef de village SHINGA	0786093401	
11.	HABIMANA Emile	chef de village RWARA	0788436689	
12	Musabyimana Béatrice	chef de village Karambi	0786093485	
13.	Nzabonimpa Jean de Dieu	chef de village RUNYONZA	0786093318	
14.	Karangwa Thomas	Chef de village Gasambu	0786093470	
15	Bizimungu Ezechiel	Chef de village Bweramana	0786093577	
16	HAKIZIMANA jean de Dieu	President wa SACCO Mukin	0787690111	
17.	Nkalilinda Anastasi	Chef de village Cyamugani	0782315898	
18.	Ntagugura Epimaka	Chef de village Rwangoga	0786093409	

Nyanza

11/08/2016

LISTE Y'ABITABIRIYE INAMA YO KUWA ~~11~~/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N⁰	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
18.	GATERA Eric	Ushinzwe imihanda mu Karere ka Nyanza	0788477155	[signature]
19.	Philbert UWINGIMANA	Ushinzwe [illegible] mu Karere ka Nyanza	0788829963	[signature]
20.	INGABIRE Claire	E/S w'umurenge wa Mukingo	0785833439	[signature]
21.	UMURERWA Marie Christine	Admin / BUSORO Sector	0788589283	[signature]
22.	GASORE Clement	E/S KIGOMA	0785833491	[signature]
23	RUJOMBYANA Alexis	Opinion Leader Nyamiyaga	0788405794	[signature]
24.	DUFATANYE Jean de Dieu	S. Land manager Muyira	0788616889	[signature]
25	HABUMUREMYI Jean de Dieu	Land Manager	0787519669	[signature]
26.	GAHIZI Eugène	land manager / KIGOMA	0783014264	[signature]
27.	Kanuma Jean Bosco	chef w'umudugudu	0786095662	[signature]
28.	MUKAMANA Victoire	E/S Rukingiro / Busoro	0788878577	[signature]
29.	UMUTESI Sylvie	E/S Masangano cell	0788517190	[signature]
30.	NZIGIYE Charles	Opinion Leader BUSORO	0785548559	[signature]
31.	NDAHIMANA Théogène	E/S GATI Cell	0787694464	[signature]
32.	RWAGATARE Narcisse	Umukuru w'umudugudu	0786095652	[signature]
33.	Ngendahimana Isidore	P.S.F Busoro	0788848912	[signature]
34.	BIZIMANA Berchimas	Chef w'umudugudu / MUYIRA	0786093045	[signature]

Nyanza

11/08/2016

LISTE Y'ABITABIRIYE INAMA YO KUWA 11/08/2016 YIZE KU MUSHINGA WO KUBAKA UMUHANDA NGOMA-BUGESERA-NYANZA

N⁰	AMAZINA	ICYO AKORA /INSTITUTION	TELEPHONE	UMUKONO
35.	Rwaburumba Naboth		0784696012	
36.	Niyibizi Evariste	Umukuru w'umudugudu	0728833914	
37.	Hakizimana J. paul	pasteur	0783627188	
38.	NGABONZIZA Eric	Head teacher / EAV MAYAGA	0788537391	
39.	GASANGWA EMMANUEL	UHAGARARIYE ABANDI	0788586717	
40.	MUKANSANZO Jacqueline	Head teacher KABUYE P.S	0788863585	
41.	NSENGIYUMVA Balthazar	Head teacher Nyundo P.S.	0788896421	
42.	Muganza Emmanuel	Umuhuzabikorwa w'umudugudu wa Ruteji / Mahira	0782940868	
43.	MUKANGIRA Espérance	cheftaine de zone BUHAZA / GATI	0787685992	
44.	HABIMANA Laurent	Umukuru w'umudugudu wa Kinyoni GATI	0786095551	
45.	UWIMANA Christine	ES of Nunyinya cell	0783535629	
46.	Rudakoranwa Jean Bosco	ES Nyamiyaga Cell	0787691946	
47.	A. Clément NTIBARARIKURE	Padiri inyabinyago	0788420518	
48.	Mukamurinzo Annonsiate	Umujyanama	0784214806	

49. Mirumba Vestine — chef w'umudugudu — 0786095645 — le 10/08/2016
50. MISIGARO DONASIYE — Chef de village — 0786093413
51. Ndacisamye Athanase — chef umudugudu — 0725787199
52. Mikani Gilbert — chef d'umudugudu — 0786093880

Annex 3: Traffic count results (SPEA)

Vehicle Category	Road Section		Project Road weighted average
	Ngpma - Ramiro	Kibugabuga - Gasoro	
Saloon cars and taxis	18	7	11
Light goods (vans, pickups and 4WDs)	26	21	23
Small bus: Minibuses and Matatus	57	7	28
Medium bus: coaster	30	0	13
Large buses	0	0	0
Light single unit trucks,(2 axles)	1	9	6
Medium Single Unit Trucks(2 axles)	4	0	2
Heavy Trucks (3 axles)	0	0	0
Light truck and trailers and semi trailers (3 - 4 axles)	0	0	0
Heavy truck and trailer and semi trailer (5 axles)	0	0	0
Motorcycles	455	199	304
Total without motorcycles	137	45	83
Total (All vehicles included)	593	243	387

Annex 4: Grievance Redress Mechanism

The very fact that an individual has to lose his right to property or is affected by the project activities and has to adjust to some inconvenience, triggers discontent in human nature. This discontent arouses disaffection and resistance to an idea and the notion to feel unfairly treated by the society. This perception would always lead to complaints in the event that an individuals' expectation is not met as anticipated or promised in the loss or delay in compensation or to receive a benefit to forgo a right.

In view of this, if there is any unwarranted change in the implementation process of the project, it will trigger complaints from the PAPs. This will require to be addressed lest the project fails its acceptance criteria by the general public. To deal with such emerging issues, a Grievance Redress Committee will be constituted with a membership inclusive of representative of the PAPs and a NGO at different levels.

Sources of Grievances

During the public consultations, the communities were advised to form ad-hoc project Committees to acquaint themselves with the implications of the project and be able to articulate their views to optimize anticipated benefits from the project implementation. They were informed that the project was dependent on their acceptance and their being able to effectively participate at every stage of the project development. They were informed that some of the solutions to answers to drive the project were within their control particularly on matters touching on culture and traditions that can impact negatively on the project.

Some of these issues that can cause delays and calls for dispute resolution mechanism include:

- Disputed ownership of an affected asset particularly where documentation is not reliable
- Rejection of a compensation award considered not adequate and representative of market value
- Change in mind of compensation mode by a PAP demanding for example land-for-land where only cash payment is preferred.
- High noise or vibrations levels emitted by machines during construction activities
- Disturbance in the surroundings of the worker camps
- Poor work conditions within the worker camps or/and along the project site
- Poor management of solid waste
- Risks of accidents cause of non regulated high speed during construction
- Prostitution practices as impact of the road project
- Air pollution with non regular watering of the temporary earth roads
- Destruction of fauna and flora species of natural habitat
- Impact on ecological functions of the sensitive ecosystems, Akanyaru and Akagera wetlands.

The main function of the Grievance Redress Committee (GRC) is to provide a forum for the PAPs to air their dissatisfaction arising from the compensation or implementation process of the project. This is an informal forum within the Grievance Redress Committee to fast track addressing of

emerging issues in a project that can derail a smooth implementation of a project. The Committee is to receive complaints from the PAPs through the project office either verbally or in writing and they endeavour to address the issue to the satisfaction of the complainant. If the matter cannot be addressed to the satisfaction of the complainant within the prescribed period, the complainant then may have recourse to the Committee. Failure to be satisfied, the complainant reserves the right to seek redress from the Court of law that is lengthy and costly in most cases.

The redress committee will compile registers of all complaints received from the PAPs at the project office, the actions taken and the decisions arrived at. Initially, the Resident Engineer and his staff with secretariat of the GRC will handle the complaint. Failure to arrive at a satisfactory answer, then the RE will refer the matter to the GRC that meets periodically. Whereas the GRC is constituted of people outside the Project Office of the Resident Engineer, the latter will be a co-opted member together with the Contractors representative for expeditious resolution of the complaints regarding the project.

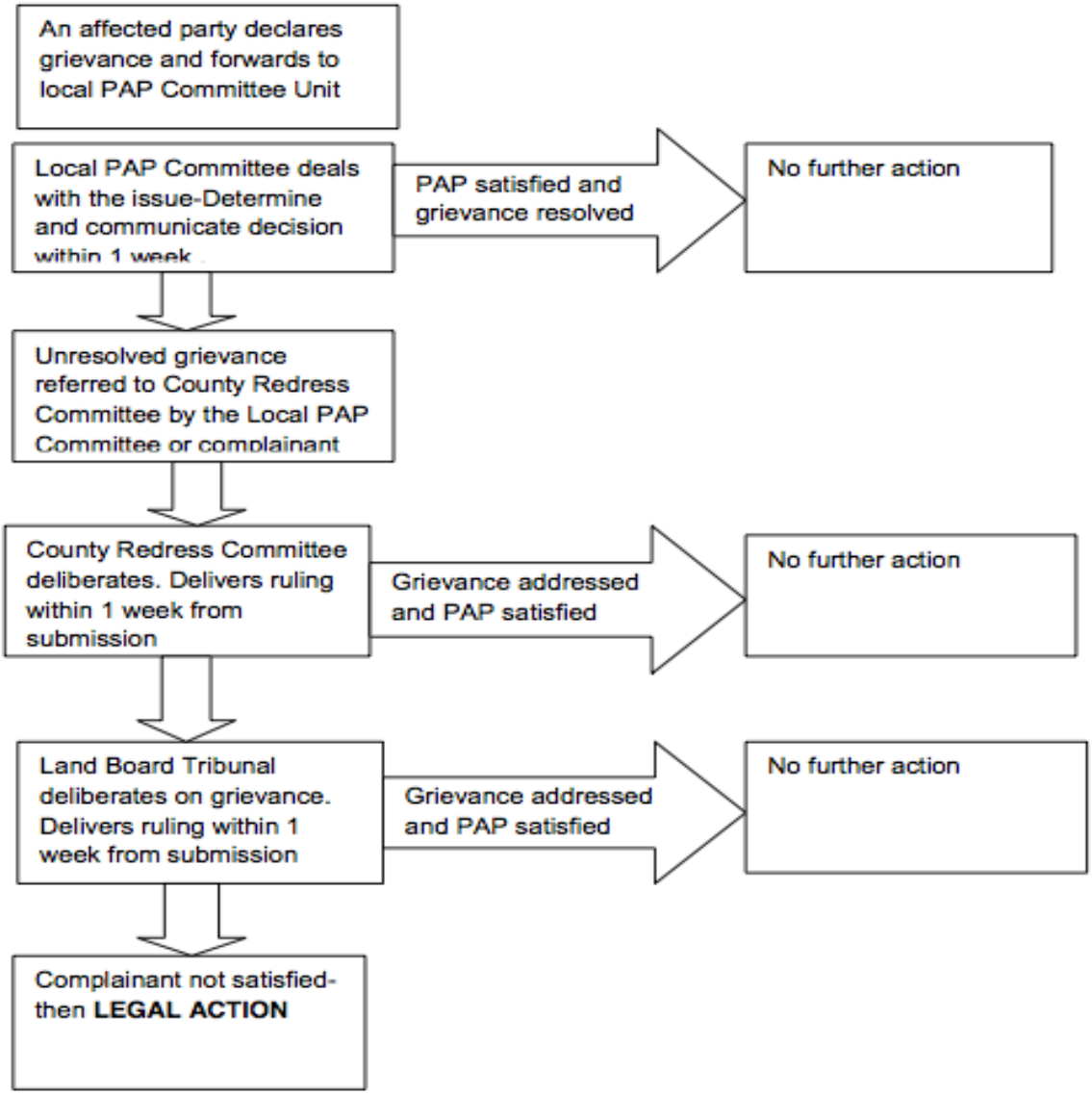

Figure 1: Grievance Redress Procedure

Grievance Redress Sub-Committee

Grievance Redress Sub–Committee shall be formed within the Project Resident Engineers Office. They shall address the issues in the following manner:-

(i) Register the grievances raised by the PAPs; and

(ii) Address the grievances forwarded by the RC/PAPs representatives.

Grievance Redress Sub-Committee shall try as much as possible to arrive at a compromise on complaints raised. This may be obtained through a series of mediation and negotiation/arbitration exercises conducted with the individual PAP. If the PAP accepts the recommendations made by the committee, the committee along with a PAP who is willing to take part in these proceedings may hold mediations at the appointed places.

Annex 5: Biodiversity inventory of Akagera wetland

Tab. 10: Transect observations of Birds in Akagera Complex 8.6.2011										
	1	2	3	4	5	6	7	8	9	10
Altitude	1291 m	1290	1286	1284	1285	1286	1285	1285	1284	1282
Coordinates South	S02.02.003	02.01.57.1	02.01.54.8	02.01.52.3	02.01.49.7	02.01.47.4	02.01.45.1	02.01.44.1	02.01.43.6	02.01.41.6
Coordinates East	E030.49.55.7	030.49.55.3	030.49.55.7	030.49.57.2	030.49.58.8	030.50.00.3	030.50.03.4	030.50.05.3	030.50.07.1	030.50.10.7
hour	8h15	8h30	8h45	9h00	9h15	9h30	9h45	10h00	10h15	10h30
Scientific Name										
Amaurornis flavirostis			2							
Amblyospiza albifrons	2									
Anastomus lamillegerus	3									
Anthus leucophrys			3		1					
Ardea purpureus				1				1		
Balearica regulorum				2						
Bostrychia hagedash			1							
Bubulcus ibis										8
Cisticola sp. ?								2		
Colius striatus							2	1		
Coracias caudata	1			1						
Corythaixoides personata		1								
Eminia lepida		1	2							
Ephippiorhynchus seneg.	3									
Estrilda astrild									2	
Estrilda paludicola	2									
Euplectes albonatatus					1				2	
Euplectes axillaris	1	3	4	2	3				2	
Halcyon senegalensis									1	1
Lagonosticta senegala			2							2
Lamprotornis caudatus	4	2	2	2	2		3	1		
Lamprotornis chalybaeus	7		3	2		6		7		
Laniarius erythrogaster						1				
Laniarius mufumbiri		1								
Merops pusillus							2	1		
Milvus migrans						1				
Muscicapa aquatica									1	
Nectarinia chloropygia	2									
Nectarinia erythrocerca							1	2		1
Passer griseus	1									
Ploceus baglafecht	2									
Ploceus capitalis							2	5	17	
Ploceus cucullaus	3			3						

Ploceus ocularis							1			
Pogoniulus bilineatus					1	1				
Pycnonotus barbatus		1		1	1	1				
Quelia quelia	25	5	5	10	7	9	11	7	18	
Serinus mozambicus		1								
Streptopelia capicola	1	1								
Streptopelia semitorquata						1	2			
Streptopelia senegalensis	3		1	2	1		1			
Turdoides sharpei				5						
Turtur afer		1								
Uraeginthus bengalus	1		1							
Urucolius macrourus									1	
Vanellus senegallus			1							
Vidua macroura				8	2		2	1		

Annex 6: Bird species family in Akanyaru wetlands

No	Family	No of species
1.	Accipitridae	11
2.	Alcedinidae	3
3.	Anatidae	6
4.	Ardeidae	9
5.	Charadriidae	2
6.	Ciconiidae	2
7.	Cisticolidae	2
8.	Coliidae	1
9.	Columbidae	4
10.	Corvidae	1
11.	Cuculidae	3
12.	Dicruridae	1
13.	Emberizidae	8
14.	Fringillidae	3
15.	Gruidae	1
16.	Hirundinidae	4
17.	Jacanidae	2

18.	Laniidae	3
19.	Malaconotidae	2
20.	Meropidae	1
21.	Motacillidae	5
22.	Muscicapidae	3
23.	Musophagidae	2
24.	Nectariniidae	5
25.	Passeridae	1
26.	Pelecanidae	2
27.	Phasianidae	1
28.	Ploceidae	9
29.	Pycnonotidae	1
30.	Rallidae	1
31.	Scolopacidae	1
32.	Scopidae	1
33.	Sylviidae	1
34.	Sturnidae	1
35.	Threskiornitidae	2
36.	Timaliidae	1
37.	Turdidae	4
38.	Zosteropidae	1
Total		**111**

Annex 7: Indigenous trees and other plant species in the project area

Local name	Scientific name
33. Akaziraruguma	Begonia meyeri johanni
34. Amadwedwe	Euphorbia grantii
35. Bambuwa	Coryza sumatrensis
36. Barakatsi	Acacia mearnsii
37. Bugangabukare	Hygrophila auriculata
38. Iboberi	Morus alba
39. Icyicamahirwe	Tithonia sp.
40. lcyuyuyu	Pavonia urens
41. lcyumwa	Trichodesma zeylanicum
42. Idaforoma	Vinca rosea
43. Idoma	Vernonia aenulans
44. Igicucu	Manihot glaziovii
45. Igicumucumu	Botriocline ugandensis
46. Igicunshu	Coleus kilimandschari
47. Igihungeri	Protea madiensis
48. Igihondohondo	Dracaena steudneri
49. Igikakarubamba	Aloe dawei
50. Igikakarubamba kizungu/taburini	Aloe sp.
51. Igikamba/itabi	Nicotianum tabacum
52. Igisura	Urtica dioica
53. Igitabitabi	Nicotianum tabacum (wild tobacco)
54. Igitenetene	Kalanchoe sp.
55. Igitoborwa	Solanum capsicoides
56. Igitotsi	Blumea alata (syn lagera)
57. Igiturabuguma	Hibiscus diversifolius
58. Igitovu	Acanthus pubescens
59. Ikararambwe	Rubia cordifolia
60. Ikegera	Senecio ladiensis
61. Ikibonobono	Ricinus communs
62. Ikibonobono	Psychotria sp.
63. Ikigwarara	Berkheya spekeana
64. Ikiha/umuduha	Euphorbia candelabrum
65. Ikimungu	Opuntia vulgaris/O. ficus indica
66. Ikinyankurwe	C/erondendrum fuscum/johnstonii

67. Ikinyondonyondo	Kalanchoe sp.
68. Ikizimyamuliro	Guizotia scabra
69. Ikiziranyenzi	Clerondendrum rotundifolium
70. Ikura	Unidentified sp.
71. Imbabazi	Microg/ossa pyrifolia
72. Indarama	Unidentified sp.
73. Inkeli/umukeli	Rubus rigidus
74. Intobo	Solanum aculeastrum
75. Intoryi	Solanum melongena
76. Inyabarasanya	Bidens pilosa
77. Inzirane	Cassia floribunda
78. Iralire	Senecio stuhlmannii (syn. cydonifolia)
79 Ireke/Iginetenete	Kalanchoe beniensis
80. Isonga	Ocimum americanum
81. Kamenamaseke	Polygala luteo-viridis
82. Kavunjahomo/akavunjahoma	Chenopodium ambrosioides
83. Mahuru	Leptactina platyphilla
84. Magaru	Hypoestes verticillaris
85. Nyirakayenzi	Unidentified sp.
86. Quinquina	Cinchona sp.
87. Rubamba	Sanseveria sp.
88. Rubilika	Unidentified sp.
89. Ubuhandanzovu	Tribulus terrestris
90. Ubutwiko	Helichrysum fruticosum
91. Umubazi	Monechma subsessile (epiphyte)
92. Umubilizi	Vernonia amygdalina
93. Umubogora	Cissus quadrangularis
94. Umucaca	Cynodon aethiopicus/C. ulemfuensis
95. Umucucu	Solanum incanum
96. Umucundura	Triumfetta sp.
97. Umucyuro	Cassia didymobotrya
98. Umufatangwe	Ceasalpina decapetala
99. Umufumba	Ekebergia capensis
100. Umufumbageshi	Balthasaria schliebenüvar. intermedia
101. Umuganashya	Cussonia ho/stii
102. Umugasa	Toddalia asiatica

103. Umugano	Arundinaria alpina
104. Umugombe	Chenopodium ugandae
105. Umugote	Syzygium parviflorum
106. Umugwamporo/umuboboli	Trema orientalis
107. Umuhanga	Maesa lanceolata
108. Umuharakuku	Rhyndosia hirta
109. Umuhashya	Dalbergia lactea
110. Umuhati	Dracaena afromontana
111. Umuhati kizungu (has red leaves)	Dracaena afromontana?
112. Umuhatu	Pavonia patens
113. Umuhe	Clerondendrum fuscum
114. Umuhengeli/irandani	Lantana camara
115. Umuhikakiza	Unidentified sp.
116. Umuhokoro	Mikaniopsis tedlei
117. Umuhombo	Ficalhoa laurifolia
118. Umuhuhu/gapeli	Physalis peruviana
119. Umuhuhwe	Croton dichogamus
120. Umuhumuro	Maesopsis eminii
121. Umukamambogo	unidentified sp.
122. Umukaragata	Embelia schimperi
123. Umukiryi	Virectaria major
124. Umuko	Erythrina abyssinica
125. Umukobe	Ficus sp.
126. Umukoni	Synadenium grantii
127. Umukoni kizungu (has red leaves)	Synadenium compactum
128. Umukonora	Gloriosa simplex
129. Umukorokombe	Grewia similis
130. Umugosora	Verbena officinalis
131. Umukubayoka	Cassia floribunda
132. Umukumbuguru	Clerondendrum buchholzii
133. Umukurazo	Vernonia hochstetteri
134. Umukuzanyana	Clerondendrum myricoïdes
135. Umulyawabasaza	unidentified sp.
136. Umumenamabuye	Pavetta ternifolia
137. Umumeya	Albertisia exelliana
138. Umunanira	Rhamnus prinoides

139. Umunkamba	Clematis sinensis/C. hirsuta
140. Umuno	Clausena anisata
141. Umunyegenyege	Sesbania sesban/S. macrantha
142. Umunyinya	Acacia sieberiana
143. Umuravumba	Tetradenia riparia
144. Umurehe	Ficus vallis-choudae
145. Umurerabana	Vernonia adoensis
146. Umuretezo	Anisopappus africanus
147. Umurogora/umukaka	Bersama abyssinica
148. Umuryogera	Crotalaria recta
149. Umuruku	Tephrosia vogelii.
150. Umusagara	Rhus vulgaris
151. Umusange	Entada abyssinica
152. Umusarenda	Triumfetta cordifolia
153. Umusasa	Sapium ellipticum
154. Umusave	Markhamia lutea
155. Umusebe	Cassia floribunda
156. Umusebeya	Albizia sp.
157.Umusekera	Macaranga neomilbreadiana
158. Umusena/umuseno	Ficus asperifolia
159. Umusene	Dasylepis racemosa
160. Umushubi'	Maytenus sp./Dovyalis sp.
161. Umushunshu	Solanum incanum
162. Umusororo	Indigofera erecta
163. Umutagara	Senecio mannii
164. Umutagarasoryo	Solanum anguivi/S. indicum
165. Umutakaforo	unidentified sp.
166. Umutarishonga	Cluytia abyssinica
167. Umutinsyi	Erytrococca bongensis
168. Umutobotobo	Solanum aculeastrum
169. Umutozo	Hibiscus fuscus
170. Umuturirwa	Waltheria indica
171. Umuturuturu	Schefflera goetzenii
172. Umuvumo	Vernonia sp.
173. Umuvumu/gasuru	Ficus thonningii
174. Umuyenzi	Euphorbia tirucalli

175. Umuyogera/kayogera	Crotalaria incana sp. purpurescens
176. Umuyogoro	Millettia dura
177. Umuyoka	Cassia occidentalis
178. Umuzabibu	unidentified sp. [raisin]
179. Umuzibaziba	Mitragyne rubrostipulata
180. Umwamira	Terminalia mollis?
181. Umwange	Senecio angulatus
182. Umwanzuranya	Vernonia smithiana
183. Umwenya	Ocimum suave
184. Umwisheke	Chenopodium ambrosoïdes
185. Umwumba	Prunus africana
186. Umwungo	Polyscias fulva
187. Uruberwa	Hibiscus cannabinus
188. Urubingo	Pennisetum purpureum
189. Uruhehe	Botriocline longipes
190. Uruheza	Phyllanthus niruri
191. Urukwamo	Pennisetum sp.
192. Urusayura	Thunbergia alata
193.Urusenda	Capsicum frutescens

Annex 8: Invitation letters to public consultations

REPUBLIC OF RWANDA

Kigali, 29 JUL 2016
Ref N°/GC13/SPIU/016

RWANDA TRANSPORT DEVELOPMENT AGENCY
KG 563 St., Queen's Land House, 1st Floor
P.O Box 6674
Email: info@rtda.gov.rw
KIGALI

Mayor of BUGESERA District
P.O Box 1 NYAMATA
Eastern Province – Rwanda

Dear Sir,

REF: UPGRADING PROJECT OF NGOMA-BUGESERA-NYANZA ROAD

RE: INVITATION TO PUBLIC CONSULTATIONS

The Government of Rwanda through Rwanda Transport Development Agency (RTDA) in partnership with the World Bank and Japan International Cooperation Agency (JICA) plans to upgrade the existing unpaved Ngoma-Bugesera-Nyanza Road (130 Km) that crosses three districts namely Ngoma and Bugesera in Eastern Province and Nyanza in Southern Province.
RTDA has hired Eco Design & Protection (ED&P) Ltd to carry out Consultancy Services to prepare the Environmental and Social Impact Assessment (ESIA) as well as the Resettlement Action Plan (RAP) as part of the conditions advanced by the World Bank and JICA to consider their financing.

In that context Eco Design & Protection (ED&P) Ltd is planning to hold consultation meeting in Bugesera district on **9th August 2016 at 10 AM at the District's office** in order to collect stakeholders concerns and views about the project.

It is with great pleasure that we invite local authorities representatives in your district as well as local civil society, private sector, women and youth associations, church organizations, and opinion leaders located in the corridor of influence of the above mentioned road project to the stakeholders consultation meetings.

For any information regarding the exercise, you can contact Mr. Jean Pierre KABAGEMA (Phone number: 0788696026 or e-mail: kabajp14@gmail.com).

Sincerely;

Guy M. KATISA
Director General

Cc:
- Hon. Minister of Infrastructure
- Hon. Minister of Local Government
- Hon. Minister of State In Charge of Transport
- Permanent Secretary/ MININFRA
- Governor of Eastern Province RWAMAGANA
- Director General of Eco Design & Protection Ltd KIGALI

REPUBLIC OF RWANDA

Kigali, 29 JUL 2016
Ref N°:ASMS./SPIU/016

RWANDA TRANSPORT DEVELOPMENT AGENCY
KG 563 St., Queen's Land House, 1st Floor
P.O Box 6674
Email: info@rtda.gov.rw
KIGALI

Mayor of NYANZA District
P.O Box 62 NYANZA
Southern Province - Rwanda

Dear Sir,

REF: UPGRADING PROJECT OF NGOMA-BUGESERA-NYANZA ROAD

RE: INVITATION TO PUBLIC CONSULTATIONS

The Government of Rwanda through Rwanda Transport Development Agency (RTDA) in partnership with the World Bank and Japan International Cooperation Agency (JICA) plans to upgrade the existing unpaved Ngoma-Bugesera-Nyanza Road (130 Km) that crosses three districts namely Ngoma and Bugesera in Eastern Province and Nyanza in Southern Province.
RTDA has hired Eco Design & Protection (ED&P) Ltd to carry out Consultancy Services to prepare the Environmental and Social Impact Assessment (ESIA) as well as the Resettlement Action Plan (RAP) as part of the conditions advanced by the World Bank and JICA to consider their financing.

In that context Eco Design & Protection (ED&P) Ltd is planning to hold consultation meeting in Nyanza district on 11th August 2016 at 10 AM at the District's office in order to collect stakeholders concerns and views about the project.

It is with great pleasure that we invite local authorities representatives in your district as well as local civil society, private sector, women and youth associations, church organizations, and opinion leaders located in the corridor of influence of the above mentioned road project to the stakeholders consultation meetings.

For any information regarding the exercise, you can contact Mr. Jean Pierre KABAGEMA (Phone number: 0788696026 or e-mail: kabaip14@gmail.com).

Sincerely;

Guy M. KALISA
Director General

Cc:
- Hon. Minister of Infrastructure
- Governor of Southern Province NYANZA
- Hon. Minister of Local Government
- Hon. Minister of State In Charge of Transport
- Director General of Eco Design & Protection Ltd KIGALI
- Permanent Secretary/ MININFRA KIGALI

Website: http://rtda.gov.rw

REPUBLIC OF RWANDA

Kigali, 29 JUL 2016
Ref N=KG/L/SPIU/016

RWANDA TRANSPORT DEVELOPMENT AGENCY
KG 563 St., Queen's Land House, 1st Floor
P.O Box 6674
Email: info@rtda.gov.rw
KIGALI

Mayor of NGOMA District
P.O Box 01. CYASEMAKAMBA
Western Province - Rwanda

Dear Sir,

REF: UPGRADING PROJECT OF NGOMA-BUGESERA-NYANZA ROAD

RE: INVITATION TO PUBLIC CONSULTATIONS

The Government of Rwanda through Rwanda Transport Development Agency (RTDA) in partnership with the World Bank and Japan International Cooperation Agency (JICA) plans to upgrade the existing unpaved Ngoma-Bugesera-Nyanza Road (130 Km) that crosses three districts namely Ngoma and Bugesera in Eastern Province and Nyanza in Southern Province.
RTDA has hired Eco Design & Protection (ED&P) Ltd to carry out Consultancy Services to prepare the Environmental and Social Impact Assessment (ESIA) as well as the Resettlement Action Plan (RAP) as part of the conditions advanced by the World Bank and JICA to consider their financing.

In that context Eco Design & Protection (ED&P) Ltd is planning to hold consultation meeting in Ngoma district on 9th August 2016 at 2 PM at the District's office in order to collect stakeholders concerns and views about the project.

It is with great pleasure that we invite local authorities representatives in your district as well as local civil society, private sector, women and youth associations, church organizations, and opinion leaders located in the corridor of influence of the above mentioned road project to the stakeholders consultation meetings.

For any information regarding the exercise, you can contact Mr. Jean Pierre KABAGEMA (Phone number: 0788696026 or e-mail: kabajp1469@mail.com).

Sincerely;

Guy M. KALISA
Director General

CC:
- Hon. Minister of Infrastructure
- Hon. Minister of Local Government
- Hon. Minister of State In Charge of Transport
- Permanent Secretary/ MININFRA
  KIGALI
- Governor of Eastern Province
  RWAMAGANA
- Director General of Eco Design & Protection Ltd
  KIGALI

Annex 9: Socio-economic survey questionnaire

INTERVIEW CODE								

AFFECTED HOUSEHOLDS SOCIO-ECONOMIC BASELINE SURVEY

1 HOUSEHOLD IDENTIFICATION

1.1	Household head's FULL name
1.2	Household head's ID Number:
1.3	Respondent's name
1.4	Respondent's Relation to Household Head. **0.** Self **1.** Spouse **3.Son**/Daughter **4.**Relative **5.** Other
1.5	Location: Sector Cell Village
1.6	Time (years) that household has been in this location: **1.** < 1 year **2.** 1-10 years **3.** > 10 years
1.7	If <1 year, where did the household move from? District Sector Cell Village

2 CATEGORY AFFECTED

Please describe your household's relationship to the affected area. (*More than one option possible).*

2.1 Own farmland within the area, and utilize it yourself? Yes No

2.2 Own farmland within the area, and hire/lease it to somebody? Yes No

2.3 If you OWN land which is hired/leased to somebody, please provide details as follows:

Name of person(s) using land	Nature of tenure L=Lease S=Sharecrop	Main crop grown on land	Duration of agreement (Years)	Time that agreement has been in place? (Years)	Area (m^2)

2.4	Hire/Rent land within the affected area from somebody?	Yes	No
2.5	Have leasehold over land in the affected area?	Yes	No
2.6	Sharecrop within the affected area?	Yes	No
2.7	Work for somebody who owns land within the affected area?	Yes	No
2.8	Own Structures (houses) within the affected area?	Yes	No
2.9	Other (please describe).....	Yes	No

2.10 If You USE land which belongs to somebody else, please provide details as follows:

Name of Landowner	Nature of tenure L=Lease S=Sharecrop	Main crop grown by you on land	Duration of lease/Rent (years)	Used for How Long (years)	Area (m^2)

1

3 HOUSEHOLD COMPOSITION

3.1 We would like information regarding all members of this household (children and adults) as of February 2016. This includes those who are members of the household who area way today but who normally live here. Could you please answer the following questions, starting with yourself and then moving from the oldest to the youngest household member?

#	Name	Sex M/F	Age	Religion 1=Catholic 2=Protestant 3=Islam 4=Other....	Relation to Household Head 1=Head 2=Spouse 3=Son/Daughter 4=Child in Custody 5=Father/Mother 6=Brother/Sister 7=Grandchild 8=Other relative 9=Non-relative	Education Level: 0=No school 1=Preschool 2=Primary 3=Secondary /Technical 4=Tertiary	Away from Home 0= At home 1=Boarding school 2=Work away 3= Other	Employment Status: 1=Salaried 2=Self-Employed 3=Farmer 4=Unemployed 5=Child/Elderly	Primary Occupation (Excluding Children and Elderly)	Secondary Occupation (Excluding Children and Elderly)	Other Skills (eg. Driving, nursing, teaching, welding, tailoring, Carpentry, hair dressing)	Disabled 1=Yes 0=No
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Occupations: 0= None **1**=Farmer **2**= Teacher **3**= Doctor/Nurse **4**=Welder **5**=Carpenter **6**=Tailor **7**=Hair Dresser **8**=Engineer **9**=Trader **10**=Factory worker **11**=Builder **12**=Public servant **13**= Army/Police **14**= Other

4 ASSETS

4.1 Household items: Which of the following items are available (in a working condition) for use by your household?

Item	Own? (Please
Bicycle	**1.** Yes / **2.** No
Mobile Phone	**1.** Yes / **2.** No
Radio	**1.** Yes / **2.** No
Television set	**1.** Yes / **2.** No
Cassette player / Radio cassette	**1.** Yes / **2.** No
Sewing machine	**1.** Yes / **2.** No
Motor cycle	**1.** Yes / **2.** No
Car/truck	**1.** Yes / **2.** No
Refrigerator / deep freeze	**1.** Yes / **2.** No
Foam mattress	**1.** Yes / **2.** No
Gas/electric stove or cooker	**1.** Yes / **2.** No
Furniture suite (Wooden chairs)	**1.** Yes / **2.** No

4.2 Buildings/structures (more than one option/material is possible)

	Type of building/structure House = 1 Kitchen = 2 Toilet = 3 Storage area = 4 Annex = 5 Other = 6	Materials used **Walls** Wood & mud = 1 Stones & mud = 2 Stones & cement = 3 Cement blocks = 4 Wood poles = 5 Clay Bricks = 6	**Floor** Clay = 1 Wood = 2 Cement= 3 Tiles = 4 Stone = 5 Bare Earth=6	**Roof** Thatch = 1 Tin = 2 Clay Tiles = 3 Other = 4 No roof = 5	# Rooms	Status of utilization Used = 1 Not used, complete= 2 Not used, incomplete=3
1						
2						
3						
4						
5						
6						

4.3 What toilet facilities do you have?

1 = No Toilet
2= Outside toilet –VIP (protected Pit latrine)
3= Outside Toilet – Unprotected pit latrine
4= Flush toilet with Septic tank

5 INCOME & EXPENDITURE (MONTHLY)

5.1 What are your varying sources of income? (fill what applies)

INCOME SOURCE		Rwf
Agriculture	Livestock sales	
	Crop, vegetable, fruit sales	
	Animal products' sales	
	Tea production	
	Other (specify)	
Employment (non-farm sources of income)	Self-employment: petty trading (hairdresser, seamstress, carpenter etc), sale of handicrafts	
	Salaries, wages of resident household members	
	Small scale mining	
	Charcoal / fuel wood sales	
Migrant remittances / transfers from other households	From elsewhere in Rwanda	
	From another country (specify)	
Pensions, allowances, social welfare grants and insurance payments		
Housing and land rent		
Other income sources (specify)		
ESTIMATED MONTHLY INCOME		

5.2 Savings: Does your household have cash savings? Yes No

5.3 Financial Assistance: Does your household currently have a loan? Yes No

5.4 Sources of financial assistance: If your household is short of money, who do you ask for help? *(More than one answer possible)*

Source of assistance	Please circle
Do not ask for money	1. Yes / 2. No
Sell property	1. Yes / 2. No
Sell livestock	1. Yes / 2. No
Relatives	1. Yes / 2. No
Neighbors	1. Yes / 2. No
Formal lending facility/bank	1. Yes / 2. No
Informal lending facility	1. Yes / 2. No
Other (specify)	1. Yes / 2. No

5.5 Expenditure: Please indicate the extent of expenditure on the following items in the past year

Item	Major Expenditure (3)	Moderate Expenditure (2)	Minor Expenditure (1)	No Expenditure (0)
Food				
Education				
Health				
Transport				
Funeral(s)				
Dowry				
Clothes				
Hire of labour				
Agricultural				
Other (specify)				

6 AGRICULTURE AND LAND

We would like to know about the agricultural production of your household.

6.1 Does your household have access to arable land that you use for cultivation?
1= Yes 2= No, If No Proceed to question 6.7

6.2 If yes, ask the following (for each piece of land):

#	Main Crop Grown	Size (M^2)	Distance Meters from homestead At homestead=0	Affected By Project Yes = 1 No = 2	Ownership / Land tenure rights Belongs to household = 1 Renting from another Hh = 2 Sharecropping with another Hh = 3 Other, Specify = 4
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

6.8 What livestock does your household have (if any)?

Type	Code	Number Owned
No livestock	1. Yes / 2. No	
Goats	1. Yes / 2. No	
Sheep	1. Yes / 2. No	
Pigs	1. Yes / 2. No	
Cattle	1. Yes / 2. No	
Chicken/poultry (ducks, geese)	1. Yes / 2. No	
Other, Specify	1. Yes / 2. No	

6.9 Where do you rare your livestock?

1= Home compound **2**=Free range **3** = In an enclosed farm/yard **4**= In cages / Kraal

5 = Other, Explain..... **6**= No livestock

6.10 What fruit tree does your household have?

Type	**Code**	**Number**	**Are some planted within the project affected area? Yes=1, No=0**
No Fruit Trees	0		
Orange = Amacunga	1		
Avocado	2		
Mango = Umwembe	3		
Banana	4		
Papaw = Ipapayi	5		
Apple = Pomme	6		
Pineapple = Ananasi	7		
Guava = Amapera	8		
Other (specify)	9		
TOTAL			

7 SOCIAL SERVICES

7.1 Which schools do the children of your household currently attend? *(more than one answer may be given)*

Name of school / educational institution	**Level** 1=Preschool, 2=Basic, 3=Secondary, vocational/technical 4=Tertiary	**Estimated Distance to school** **1:** <1km, **2:**>1-5Km, **3:** 5-10Km, **4:** >10km, **5:**Don't Know

7.2 Which ailments have persons in your household suffered from in the past year?

Illness	Please circle
Malaria	1. Yes / 2. No
Cough / lung problems	1. Yes / 2. No
Diarrhea	1. Yes / 2. No
Skin infection	1. Yes / 2. No
Sexually transmitted disease	1. Yes / 2. No
Eye disease	1. Yes / 2. No
Tooth ache	1. Yes / 2. No
Cholera	1. Yes / 2. No
Fever	1. Yes / 2. No
Birth complications (women)	1. Yes / 2. No
Other (specify)	1. Yes / 2. No

7.3 Where do you normally seek help when a member of your household is sick?

Facility	Code	Estimated Distance to Medical Centre **1:** <1km, **2:**>1-5Km, **3:** 5-10Km, **4:** >10km, **5:**Don't Know
Nearest General Hospital (name:	1. Yes / 2. No	
Nearest Community Health Centre (name:	1. Yes / 2. No	
Private Clinic (name: .....)	1. Yes / 2. No	
Traditional healer	1. Yes / 2. No	
Chemist / Pharmacy	1. Yes / 2. No	
Other (Specify)	1. Yes / 2. No	

7.4 Where does your household get water? *(More than one answer may be given)*

Source	Cooking, drinking	Washing, watering animals
Borehole	1. Yes / 2. No	1. Yes / 2. No
Dam	1. Yes / 2. No	1. Yes / 2. No
Private tap at house	1. Yes / 2. No	1. Yes / 2. No
Rain collected at homestead	1. Yes / 2. No	1. Yes / 2. No
Communal stand pipe	1. Yes / 2. No	1. Yes / 2. No
Well/spring (iriba)	1. Yes / 2. No	1. Yes / 2. No
River/Stream	1. Yes / 2. No	1. Yes / 2. No
Water sold by other people	1. Yes / 2. No	1. Yes / 2. No
Other (specify)	1. Yes / 2. No	1. Yes / 2. No

7.5 Which of the following energy sources (for light and/or for fuel) does your household use in the buildings where you live here? *(more than one answer may be given)*

Source	Please circle
Electricity (REG)	1. Yes / 2. No
Generator	1. Yes / 2. No
Kerosene lantern (peterome	1. Yes / 2. No
Gas lantern	1. Yes / 2. No
Charcoal (Amakara)	1. Yes / 2. No
Firewood	1. Yes / 2. No
Candle (mbuji)	1. Yes / 2. No
Traditional lamp (Agatadowa) (Amatandogora)	1. Yes / 2. No
Solar	1. Yes / 2. No
Biogas	1. Yes / 2. No
Batteries	1. Yes / 2. No
Others. *Specify*	1. Yes / 2. No

7.6 Please indicate whether you or another member of your household belongs to one of these:

Organisation	Please circle
Religion Based group	1. Yes / 2. No
Farmers' Association	1. Yes / 2. No
Development Committee	1. Yes / 2. No
Youth Group	1. Yes / 2. No
Women's group	1. Yes / 2. No
Other (specify)	1. Yes / 2. No

7.7 Who makes decisions about ownership, buying, selling and uses of the following resources in your households?

Resources	1=Husband 4=Husband and Wife	2=Wife 5= Whole Family	3=Children 6= Others, specify	
	Ownership	**Buying**	**Selling**	**Utilization**
ASSETS				
Land				
Livestock				
Credit				
Farm equipment				
INPUTS				
Seeds				
Fertilizers				
Pesticides				
Labour use				
OUTPUTS				
Crop produce				
Livestock products				

Annex 10: Stakeholders Engagement Plan

1. Introduction and background

The Stakeholder Engagement Plan (SEP) is designed to ensure effective engagement with local communities and other key stakeholders throughout the remainder of the life cycle of Ngoma-Nyanza upgrading project. This SEP builds on the previous engagement work in support of Project conceptualization, feasibility study, planning and impact assessment processes. Since this time, the project has maintained dialogue with the relevant regulators and locally affected communities and their representatives as well as non-government organisations (NGOs), community-based organisations (CBOs) and other interest groups. The project is committed to continuous engagement throughout the Project's construction and subsequent operations phases.

2. Objectives, scope and approach

2.1. Objectives

The broad objectives of this SEP are to:
Describe the applicable regulatory and/or other requirements for disclosure, consultation and ongoing engagement with the Project's stakeholders;
Identify and prioritize key stakeholder groups, focusing on Project directly affected local communities;
Provide a transparent and inclusive strategy, action plan and timetable for disclosure of information,
ensuring that engagement with each group is undertaken without any form of discrimination;
Describe the processes for implementing stakeholder engagement and community liaison activities, including any special measures for engaging with vulnerable groups and integration of this SEP into
PROJECT's wider management systems;
Establish an effective grievance mechanism, ensuring that stakeholders are properly informed of their rights and know how to communicate their concerns;
Determine roles, responsibilities and training requirements;
Define monitoring and reporting procedures; and
Ensure continuous improvement.

2.2. Scope

This SEP is part of the suite of Management Plans developed for the road's Environmental and Social Management System (ESMS) and covers all Project activities that require engagement with local communities and other stakeholders.

As the conceptualization, feasibility studies, planning and Environmental and Social Impact Assessment (ESIA) stages of the Ngoma-Nyaza road upgrading development have already been

completed, this Plan is being designed for future application to the Project's construction and later operations phases. Stakeholder interactions and grievances during implementation of the RAP will follow the guidelines and procedures set out in the RAP document; this SEP's grievance procedure shall therefore operate in parallel with the RAP methodology until completion. All other stakeholder disclosure, consultation and engagement activities will be undertaken as described in this Plan – i.e. as soon as practicable following ESHS team mobilisation.
No detailed specific closure/decommissioning phase actions or monitoring are currently proposed, Ngoma-Nyanza project shall develop a preliminary closure and rehabilitation plan after 25 years to ensure adequate financial planning for dismantling the road), then prepare a definitive plan at least 18 months prior to the anticipated cessation of activities that takes due account of the need to address stakeholder engagement needs at that time.

3. Previous Stakeholder Engagement
Formal public consultation took place during the ESIA preparation phase, and has to continue thereafter as the Project evolves. The section 6. outlines the stakeholder groups that were consulted and summarises how that consultation was undertaken.

4. Conclusion and recommendations from the ESIA
The ESIA team carried out public consultations with the local community with the main objective of getting stakeholders' views on the perceived social effects of the road project and their ideas on how the negative impacts can be mitigated / remedied. In this regard, the consulting team held several meetings with a wide range of stakeholders as discussed in section 6.2 - Approach and Methodology of the (updated) road upgrading project ESIA and a list of all stakeholders consulted is also included in the report.
The ESIA (section 6.) concluded that the local population was very positive about the road upgrading project warned that there were very high expectations among the local communities, within the Project area of influence, despite a certain "fear of unknown". This latter was ascribed to the facts that the development is without precedent in the Project footprint, the local community is still very traditional but becoming increasingly sedentary due to a range of pressures) and suffers from lack of exposure to what is happening to the rest of the country and beyond.

5. Summary of stakeholders concerns to date (see section 6.)

6. Stakeholders identification and mapping
From the outset, the project consultant has actively sought to build strategic working relationships with the various stakeholders who are directly or indirectly impacted by and/or who have interests in this Goma-Nyanza road Project. The means of identifying Project-wide stakeholders was originally defined during the range of consultation activities described in Section 6. Various activities have been conducted since then to update stakeholder lists and build on consultant knowledge of its stakeholders and their concerns.
A comprehensive list of stakeholders and database has been developed from this process and a stakeholder register is being maintained by the consultant. However, the project should be committed to improving its stakeholder engagement methodology, integrating it within its

management systems and meeting the international standards required by its Lenders. Consequently, the consultant is introducing the following changes to its methodology:

Review of existing **stakeholder database** and identification records to include consideration of stakeholders' rights and/or duties as well as their capacity to engage meaningfully with the project (i.e. factors such vulnerability, literacy, traditional lifestyle and decision-making via village elders, etc.). Records will be reviewed and updated to reflect any notable changes in stakeholder status or circumstances;

A **Commitments Register** is introduced to collate and track all new environmental and social commitments made by the project to its various stakeholders over the life of the project and ensure timely follow-through on its promises. This is an essential tool for building trust and establishing good working relationships with stakeholders.

Stakeholder categorisation is recommended, retrospectively and going forward, to facilitate the prioritisation of both "affected communities, groups and individuals" and "other interested parties" in order to ensure the effective of planned engagement and liaison activities.

7.1 Stakeholder Engagement Plan

process is being added to help define appropriate levels and types of engagement required for each defined stakeholder category, facilitating due attention to vulnerable or marginalised groups;

Key Stakeholder Profiles shall be maintained for both designated key informants and those affected parties which have influence or are subject to high impacts, the knowledge and legitimacy, and are capable and willing to engage with the project;

A **Vulnerability Screening Checklist** to facilitate evaluation of capacity and identify any future change in status to facilitate a re-evaluation of mitigation assistance where essential;

Stakeholder Engagement / Community Liaison Planning Form introduced to ensure proper preparation of each event or activity, including consideration of range of practical issues, the potential risks associated and a culturally appropriate approach; and

Contact Reports are being introduced to record all interactions with stakeholders, except for grievances which are recorded and processed. This form will be completed by the CLO or any other RTDA reprentative, employee or consultant undertaking stakeholder engagement activities. The stakeholder database will be updated with information from the Contact Reports to facilitate key word searches on specific topics, generate lists of target stakeholder groups and support the planning of engagement and liaison activities.

7.2 Stakeholders categorisation

The various international standards being applied to this project define two main categories of stakeholder; differentiating for example between "those who will be or are likely to be directly or indirectly affected, positively or negatively, by a project (commonly referred to as project-affected people, households or communities)" and "those who might have an interest in, or may influence the project". Following this definition, the two principal groups of stakeholders in the road Project are broadly categorised as follows:

Affected Parties: People/entities directly affected by the Project and/or have been identified as potentially vulnerable to change and who need to be engaged in identifying impacts and their significance, as well as in decision-making on mitigation and management measures. Affected parties are generally located within the Project's defined area of influence but may be elsewhere

(e.g. 10km away from the site but have personal or business interests that may be directly affected by the development of the road). Affected parties include 2 sub-groups:

Directly affected:

• Communities, groups and individuals displaced physically and/or economically by the Project, including any vulnerable or marginalised stakeholders.

Indirectly Affected:

Residents, businesses, officials and administrators who may be indirectly affected by employment opportunities, influx and the related pressure on resources and services;

Local community-based groups who represented affected groups and/or other affected parties; and

Employees, their representatives and contractors to the project.

Interested Parties: Other Interested Parties: people/entities that are interested in the Project and/or could affect the Project in some way. Interested parties include inter alia:

Residents of the adjacent districts to Ngoma, Bugesera and Nyanza;

National and international civil society, NGOs, CBOs or and faith-based organisations (FBOs);

Suppliers and service providers to RTDA located elsewhere in Rwanda or internationally; other notable projects in the country.

The Government of Rwanda, including government officials, permitting and regulating agencies **at the national and regional level;**

Politicians at national/ local levels;

Lenders' to the Project; and

Media, academics and other interest groups.

8. Action plans

As the Project has completed its impact assessment, consultation and approval phase, this SEP focusses upon project's interactions with both affected and interested parties during the remainder of the pre-construction, construction and operations phases. This section sets out project's plans to ensure it meets its objectives and goals for stakeholder engagement throughout the remainder of the Project in respect for each stakeholder group identified in section 6 above.

8.1 Engagement Methodologies

Stakeholder engagement and community liaison activities are determined by project's various commitments and Project scheduling, so a variety of disclosure and engagement methods will be used. Disclosure methods will vary according to the target audience and its capacity to understand the information being communicated – see guidance in the International Association for Public Participation (IAP2) Public Participation Toolbox. For example:

Visual representations (photographs, diagrams, etc) for use in public barazas and face-to-face sessions with local residents, especially where a high level of illiteracy or a lack of understanding of the predominant language is anticipated;

Brochures, leaflets, posters, non-technical summary documents and performance reports will be prepared, and made available both as/when required for specific stakeholder engagement activities and upon reasonable request from interested parties or others. Publicly available documents such as the ESIA report shall be accessible from RTDA's website. NB: only specific community disclosure documents, including this Plan, and its associated documents and forms, shall be

translated into Kinyarwanda and English. These will be available on the project website and copies of the SEP will be provided at the District Chief Offices;
Hazard warning signage will be erected to inform stakeholders of specific risks - e.g. for road works, dangerous road junctions, dangers of accidents, etc.;
Visual, informative displays along the road to explain the project to provide an outline of essential information such as access restrictions and security requirements; and
Press - newspapers, posters, radio and/or television – will be used as necessary for reaching the widest possible audience at national/international levels.
Similarly, a variety of engagement methods will be used to consult with each of the stakeholder groups identified in section 6; the specific methods may vary according to target audience, topic, etc. but are expected to include amongst others:
Interviews with legitimate stakeholder representatives and/or designated key informants;
Surveys, polls, and questionnaires of affected parties (including by mobile telephone);
Public meetings / barazas, workshops, and/or focus groups with specific groups such as vulnerable people (NB: specialist NGOs or other service providers may be hired by RTDA to undertake specific
campaigns or contribute to events);
Participatory methods; and
Other mechanisms / traditional for consultation and decision-making.
As appropriate, stakeholders will be advised how their personal contact information and feedback will be used and how RTDA will respect their privacy and the confidential nature of any issues. For each planned engagement campaign or individual activity, the ESHS Manger and CLO shall determine the precise approach and tools to be used, compiling the Stakeholder Engagement / Community Liaison Planning Form take into account of the following factors:
•What information is to be disclosed, in what format, and how it will be communicated; and How the views of vulnerable sub-groups will be taken into account.

On-going engagement with interested parties

At this stage of the Project, stakeholder engagement activities are continuing in preparation ahead of the construction phase and are focussed upon the following topics:

• **Government of Rwanda authorities and agencies:** Looking forward to secure certification of the Project's ESIAs (i.e. road upgrade) from REMA, the Rwanda Natural Resources Authority (RNRA), Rwanda Energy Group (REG), Rwanda Transport Development Agency (RTDA), Water and Sanitation Corporation (WASAC) is actively pursuing a notice to proceed from the government to allow work to commence on the road upgrading project. RDTA is also addressing the commitments and recommendations made in the ESIAs, obtaining the necessary permits and maintaining a working dialogue with RDB and other agencies as required;

Project Lenders: RTDA has been in regular communication with the consortium of Lenders to the Project and their representatives (Lenders' Engineer), clarifying the Lenders' environmental and social criteria and determining the long term performance monitoring and reporting regime;

Contractors: RTDA shall remain in discussion with its diverse contractors, clarifying its technical requirements including refinements of environmental and social compliance conditions and negotiating the later stages of the tender process; and

Affected Communities: RTDA shall maintain communications with local communities and affected vulnerable groups to keep them informed as to the progress of the Project, but is yet to start its main thrust of engagement with them in preparation for the start of construction works.

9. Planned Engagement with Affected Communities and Parties

RTDA shall launch a communications campaign to inform affected parties as follows:
Resettlement Action Plan: RTDA, shall follow up on the commitments made to the the community and to those stakeholders who will be physically and/or economically displaced by PROJECT's road upgrade works.

Project Awareness:
Ongoing sensitisation to all affected parties about the Project, its potential risks / impacts / benefits (e.g. influx, road safety, employment), RTDA's mitigation strategies and guidance on what actions affected parties need to take to protect themselves, their livestock and property. Information to be disclosed shall include:
-An update on the Project (nature, scale, timetable, etc.);
-An overview of the stakeholder engagement process and how affected parties can participate and provide feedback through programmed meetings (including how communities will be notified about meeting dates, timings and venues);

-Project risks and impacts to the environment, land use (physical and economic displacement, degradation of ecosystem services), influx, health, safety and security,
etc.;
-Mitigation plans (a summary of commitments is to be included in an update to previous disclosure materials);
-Potential benefits such as opportunities for employment and recruitment procedure
-Participatory approach involving affected communities in monitoring certain environmental impacts (e.g. pastureland, dusts and water resources); and
-PROJECT's reporting of engagement activities and disclosure of their outcomes.
In particular, affected parties will be clearly informed how to apply for employment, how to communicate complaints and how the grievance resolution and redress procedure will work. See the interim grievance procedure (NB the grievance procedure may be amended to take account of community feedback);
-HIV/AIDS and STD Awareness: An NGO will provide community awareness training during construction in the Project area of influence; and

-As appropriate, the approach to such communications shall vary according to the targeted audience. For example, barazas will be organised at each settlement for the wider communities, however a more sensitive approach shall be adopted for engaging with vulnerable people to ensure that the views of women and other relevant sub-groups (e.g. vulnerable, minorities, elderly, infirm, youth, etc.) are duly taken into account during the engagement process – see Section 6 above.
Thereafter, ongoing consultation will include the following elements:

Routine disclosure and consultation on the Project's environmental and social performance, including complaints / grievances, and any future planned developments of the road upgrading project;
Ongoing grievance resolution; and
Ongoing vulnerability screening: Regular, targeted engagement with each relevant group to identify any changes in circumstances.

10. Stakeholders Engagement Process

Appendix F presents a proposed Stakeholder Engagement Action Plan for the Project. It has been proposed for the project ahead of the mobilisation of its ESHS team and the CLO to facilitate rapid implementation ahead of the start of construction works. The ESHS Manager and the CLO will review and update this SEP on a minimum 3-monthly basis or as needed by specific circumstances during the construction phase; this will revert to an annual frequency during operations.

Routine engagements may simply be planned using the **Community Liaison diary** to record date/time, location, purpose and participants. If needed for new or more complex engagement plans, individual **Stakeholder Engagement / Community Liaison Planning Form** are completed by the CLO and authorised by the ESHS Manager to ensure proper preparation of each new engagement campaign, event or activity, including consideration of any practical issues, potential risks associated and whether or not differentiated measures such as a culturally appropriate approach are needed when engaged with vulnerable groups.

The following figure summarizes the PROJECT stakeholder engagement process:

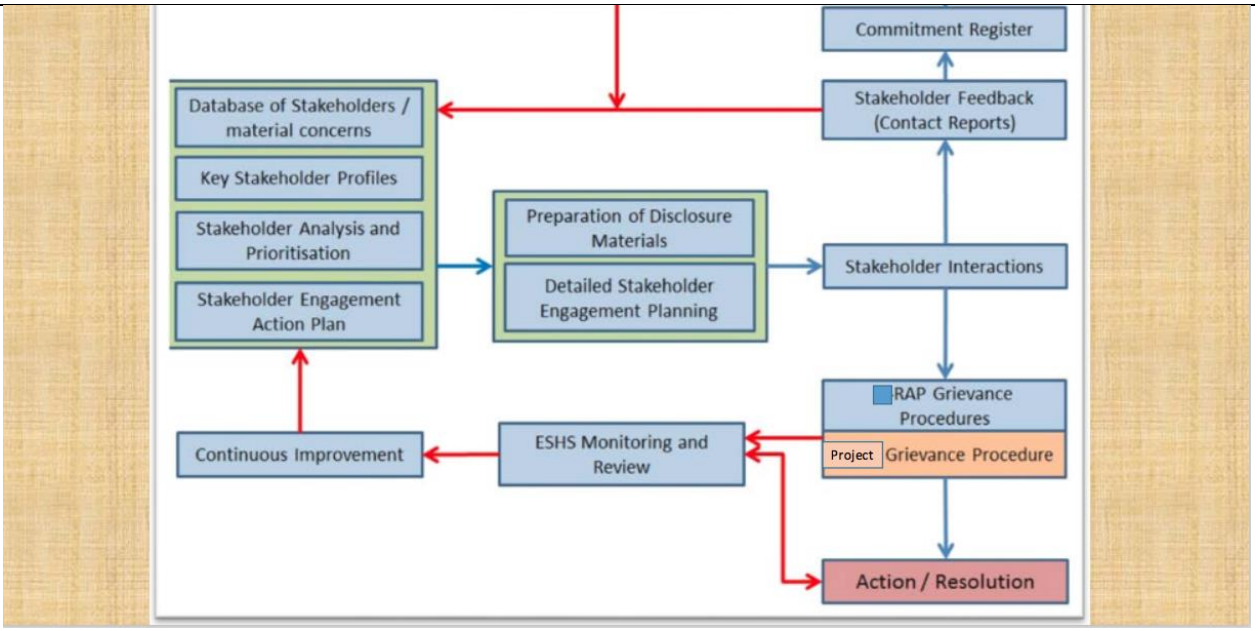

Figure 1: Overview of stakeholders engagement process

Stakeholders Engagement Actions Plan

No	Target for Engagement	Purpose of Engagement	Engagement Tasks / Methods	Schedule / Frequency	Responsibility	Project phases	Priority	Status	ESMS References / Comments
1	Government and local authorities, regulators and other agencies	Establish and maintain a good working relationship with the various authorities to promote the Project's interests, facilitate compliance and cooperate on issues of material interest to all parties	- Ongoing planned and ad hoc communications and liaison with various levels of Ministry / / Division authorities (in compliance with PROJECT's Code of Ethical Conduct) - Development of Memoranda of Understanding on specific subjects (e.g. site security) - Host regulatory visits and full cooperation during inspections and audits	Before commencing key Project activities at variable frequency depending upon role of stakeholder and subject matter (e.g. annual, bi-annual, monthly, etc. then as required during Project life cycle)	RTDA management / others as designated (e.g. Private Security company engagement with law enforcement and other government security agencies)	Pre-construction / Construction / Operation / Closure	TBA	In progress	(Security Management Plan)
2	National/ local media	Provide key information to TV / radio / newspaper / on-line media	Provide Press Releases, articles / photographs	Before commencing key Project activities at variable frequency depending upon role of stakeholder and subject matter (e.g. annual, bi-annual, monthly, etc. then as required during Project life cycle)	PROJECT management and advisors	Pre-construction / Construction / Operation / Closure	TBA	going	PROJECT Protocols for interactions with the press

3	*National / international NGOs and academia; local NGOs / CBOs*	*Provide opportunities for interested parties to obtain information on the Project and its impacts*	*Regular updates / ad hoc briefings on specific issues / opportunities plus disclosure of specific reports and information on the RTDA website*	*Before commencing key Project activities at variable frequency depending upon role of stakeholder and subject matter (e.g. annual, bi-annual, monthly, etc. then as required during Project life cycle)*	*PROJECT management*	*Pre-construction / Construction / Operation / Closure*	*TBA*	*going*	*Respond to reasonable requests) specific,*
4	*Key stakeholders (including lenders)*	*Seek opportunities for obtaining qualitative feedback on Project -related issues from key stakeholders (e.g. interested parties and/or influence-contacts)*	*Meetings, interviews and telephone calls. Can also consider establishing a more formal 'advisory group' for general feedback or on specific issue / material concern.*	*As required during Project life cycle*	*PROJECT management*	*Pre-construction / Construction / Operation / Closure*	*TBA*	*going*	
5	*Physically and economically displaced affected parties*	*Agree definitive compensation and assistance measures for those affected as per the RAP. Confirmation of the restoration of living standards and the attainment*	*Meetings/ barazas with affected groups and legitimate representatives to agree level of compensation and/or assistance (sign contract?)*	*Regular meetings following NTP as per A-RAP schedule (e.g. monthly / every 2 weeks then as required)*	*PROJECT RAP team*	*Pre-construction*	*TBA*	*going*	*Community RAP / Road Upgrading*

		of the RAP objectives.							
6.1	*Physically and economically displaced affected parties*	*Implementation of agreed compensation and assistance measures for those affected*	*- Visits to settlements / individual households as needed to disburse compensation - Supervision and follow-up of relocation assistance measures and resolution of grievances*	*As required during RAP implementation (e.g. monthly / every 2 weeks then as required)*	*PROJECT RAP team*	*Construction*	*TBA*	*TBA*	*Community RAP / Road Upgrading*
6.2	*RTDA Employees and contractors*	*Ensure project workforce and visitors to site are aware of the cultural context and are briefed on personal conduct and obligations to local communities*	*Implement community relations and cross-cultural inductions, including 'Camp Rules' and instructions prohibiting illegal / anti-social behaviour, minimising land disturbance and protection of cultural heritage (Chance Finds Procedure)*	*Contemporaneous with mobilisation of RTDA and contractor workforces with provisions for 'new arrivals' and refreshers as needed*	*ESHS Manager /CLO (plus SE Construction practitioner /consultant as necessary/HR*	*Construction Operation Closure*	*TBA*	*TBA*	*Labour Management Plan*
6.3	*Economically displaced affected parties*	*Monitor local affected stakeholders employed by the Project on contract or casual basis*	*Informal interviews with individuals or groups (planned or ad hoc, depending upon type of employment)*	*- Ad hoc for casual workers - Initial contact with contract workers within 1 month of starting work, as required thereafter (e.g. may be monthly or quarterly as minimum)*	*CLO (plus SE practitioner / Consultant as necessary)*	*Construction*	*TBA*	*TBA*	*Labour Management Plan*
6.4	*Physically and*	*Monitor*	*-Undertake community*	*- 6 monthly*	*PROJECT A-*	*Construction /*	*TBA*	*TBA*	*Labour*

	economically displaced affected parties	*relocated and compensated / assisted stakeholders to ensure timeliness and effectiveness of planned measures*	*meetings and barazas / visits to individual households to monitor reaction to changed circumstances and identify any potential cases of hardship especially amongst vulnerable groups - Formal survey every year until RAP completion audit confirms adequate close-out* *- Independent RAP completion audit*	*monitoring and meetings / household visits until Completion Audit* *- Completion Audit when RAP programme deemed completed*	*RAP team / CLO (plus SE practitioner / Consultant as necessary)*	*Operations*			*Management Plan*
6.5	*Project affected stakeholders*	*Sensitisation and awareness-raising in relation to Project schedule, activities and impacts*	*Undertake community meetings and barazas to advise on Project progress, brief them on any specific issues (such as heavy construction equipment, possible use of explosives, borrow pits, increased road traffic, security, potential influx and employment) and explain the grievance procedures* *- Customised briefings for vulnerable groups (e.g. road safety for the illiterate, elderly, children, nomads, etc.)* *- Advise on process to submit proposals for community assistance programmes to the road of Change Foundation*	*As required by each construction work package - in advance of contractor arrival for road rehabilitation, village and installations, etc.*	*CLO (plus SE practitioner / Consultant as necessary)*	*Construction / Operations*	*TBA*	*TBA*	*Stakeholder Engagement Plan / Community Health and Safety Plan*

6.6	*Project affected stakeholders*	*HIV/ AIDS and STD sensitisation*	*- Provide community awareness training ahead of the mobilisation of contractor workforces* *- Collaboration with health authorities / NGOs to support health promotion (other communicable disease, lifestyles, etc.)*	*As required by each construction work package* *- in advance of contractor arrival for road upgrade, village and installations, etc.*	*Contracted NGO (Community Liaison)*	*Construction*	*TBA*	*TBA*	*Stakeholder Engagement Plan / Community Health and Safety Plan*
7.1	*Settlements potentially affected by Project activities that generate dusts or impact upon water resources*	*Implement participatory monitoring programme for affected stakeholders*	*- Selection and training of designated stakeholders to monitor and report dust emission levels and community water resources* *- Record results and provide feedback to communities*	*Minimum contact construction for road rehabilitation works*	*RTDA Environment Officers / CLO (plus SE practitioner / Consultant as necessary)*	*Construction*	*TBA*	*TBA*	*Construction Oversight Management Plan*
7.2	*Settlements located along the main supply route but outside the Project area of influence*	*Advise residents of Project - related traffic and potential for increased road safety risks*	*- Transport contractors to liaise with relevant road and traffic police authorities* *-RTDA to brief affected communities and/or their representatives on anticipated transport movements in their area and any related road safety measures (focus on children, elderly, etc.)*	*Prior to planned movements of heavy equipment and materials transport*	*CLO (plus SE practitioner / Consultant as necessary)*	*Construction*	*TBA*	*TBA*	*Traffic Management Plan*
7.3	*Community around the road*	*Ensure good working relationship is established and maintained with the neighbouring community*	*Regular and ad hoc meetings / barazas; possible occasional social events for PROJECT / communities (e.g. respect for traditional rites / festivals)*	*Weekly courtesy visit / monthly formal meeting or as required throughout the Project*	*CLO (plus SE practitioner / Consultant as necessary)/ ESHS Manager*	*Pre-construction / Construction / Operation / Closure*	*TBA*	*Ongoing*	*Stakeholder Engagement Plan / Community Health and Safety Plan*
7.4	*Vulnerable*	*Ensure*	*- Visits to vulnerable groups /*	*- Minimum 6-*	*CLO (plus SE*	*Construction /*	*TBA*	*TBA*	*Stakeholder*

	groups	*adequate Project protection of vulnerable groups and individuals and monitoring any changes to the level of marginalisation or disadvantage of others*	*individuals, as required to monitor situation and if applicable identify additional mitigation measures* *-Survey / check 'vulnerability status' of stakeholder who have been potentially more marginalised or disadvantaged by the Project* *-Liaison with relevant authorities and NGOs with a view to developing focused mitigation measures*	*monthly during construction / annually operations - identification of a specific need or at a minimum frequency of annually during construction and the first two years of operations*	*practitioner / Consultant as necessary)*	*Operations*			*Engagement Plan / Community Health and Safety Plan*
8.1	*Settlements potentially affected by uncontrolled in-migration*	*Implement a participatory monitoring programme for potential influx and associated impacts*	*-Sensitisation and awareness-raising of potential Project-related influx and its impacts in order to involve target communities in decision-making (threshold levels for interventions) monitoring and developing contingency plans in the event of significant uncontrolled in-migration* *- Capacity building for individuals selected as monitors* *- Engagement with relevant authorities and NGOs*	*Before commencing key Project activities at variable frequency depending upon role of stakeholder and subject matter (e.g. annual, bi-annual, monthly, etc. then as continue thereafter as required*	*CL O (plus SE practitioner / Consultant as necessary)*	*Construction / Operations*	*TBA*	*TBA*	*Influx Management Plan*
8.2	*All affected and interested parties*	*Provide stakeholders with information on Project progress and performance on matters of material concern*	*- Prepare and disclose brochure on the Project's local stakeholder engagement programme* *- Prepare an annual performance report (non-technical) for disclosure to local communities (e.g. in planned meetings or limited circulation to village chiefs and legitimate*	*engagement brochures prepared construction operations Separate to be for and phases*	*ESHS Manger / CLO*	*Construction-Operations transition / Operations*	*TBA*	*TBA*	*Policy requirements IFC PS1*

		including resolution of complaints	*representatives) and wider society (e.g. via website)*						

Annex 11: Interim checklist - Review of E&S Implementation in T &I Bank-financed Works Contracts

Project Name		
Project Number		
Country		
Contract Name		
Contract Duration and completion date		
Implementing Agency		
Review Date		
No	Measure	Current Status (Please elaborate rather than a "Yes/No"- approach)
Contractual Arrangements on site		
1	Is there a full-time Employer's Representative (ER) on site at all times? If not frequency of visits?	
2	Years of experience of the ER?	
3	Name of Supervision Consulting Firm (SC)	
4	Does SC TOR require oversight over ESMP, RAP, HIV/AIDS awareness implementation?	
5.	If yes, to the above, does the SC contract provide sufficient resources?	
6.	If yes, to the above, does the works contract provide sufficient resources to implement all activities? Are they provisional sums or budgeted activities?	
7	Name of SC Team Leader The Resident Engineer - RE)	
8	Years of experience of RE	
9	Does the Employer have an Environmental Unit – if yes, how many full-time technical staff are employed?	
10	Does the Employer have an Social Unit – if yes, how many full-time technical staff are	

	employed	
Contract Reports and Instruments		
11	Does the Bank receive Monthly Progress Reports from the RE on schedule?	
12	ESMP in place, and cleared, being implemented and documented in the MPRs? Provide dates of submission and clearance and any sequencing of works to accommodate clearance process.	
13	Is the ESMP an integral part of the contractors contract with clear activities and costs?	
14	RAP or ARAP, if required, completed and RAP or ARAP completion Report cleared? Provide dates of submission and clearance and any sequencing of works to accommodate clearance process.	
15	Is there any additional expropriation which will require a RAP amendment?	
16	Contractor's Health and Safety Management Plan in place and approved by ER, and implementation documented in the MPR?	
17	Any Citizen engagement activities under implementation?	
18	Any Gender-based activities and/or data collection in place	
19	Contractor's Traffic Management Plan in place, cleared by RE, and being implemented?	
20	HIV/AIDS Awareness/STI mitigation measures in place?	
21	Who is HIV/AIDS service provider? Are they registered with	

	the National Aids Commission?	

Site arrangements		
22	Grievance Redress System in place?	
23	Contractor/Cs/ER combined Meetings with affected communities undertaken and how regularly?	
24	Number of contractor's staff provided with site accommodation.	
25	Distance of contractor's base camp vis-à-vis towns, villages, centers of population and environmentally sensitive areas.	
26	Percentage of staff recruited from the Project Impact Area vs. brought from outside.	
27	Condition of site accommodation and amenities provided.	
28	Do out-of-area workers receive any allowances additional to their salary/wages? If so, please describe.	
29	Wages paid to casual and permanent works and their compliance with local labor laws.	
30	Compliance with local working hours and site safety laws for contractor's workers.	
31	Are Contractor's staff wearing issued personal protection equipment?	
32	Emergency contact numbers for Contractor/ ER shown in conspicuous place?	

Annex 12: Ilustrative design drawings and information

The proposed cross sections are highlighted in the following drawings:

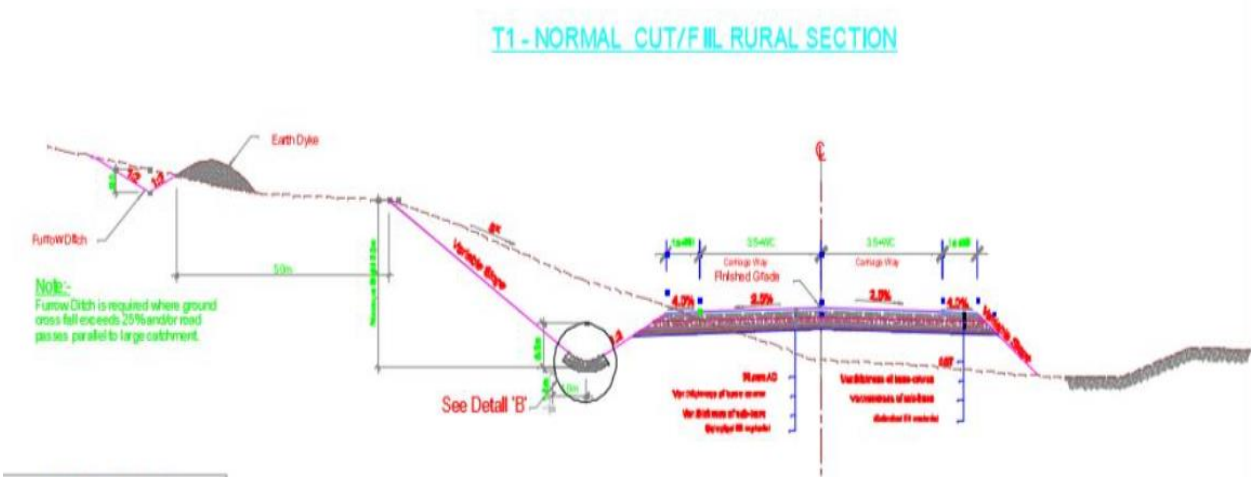

Figure 1: Rural typical sections

Consultant identified the following potential design optimizations:

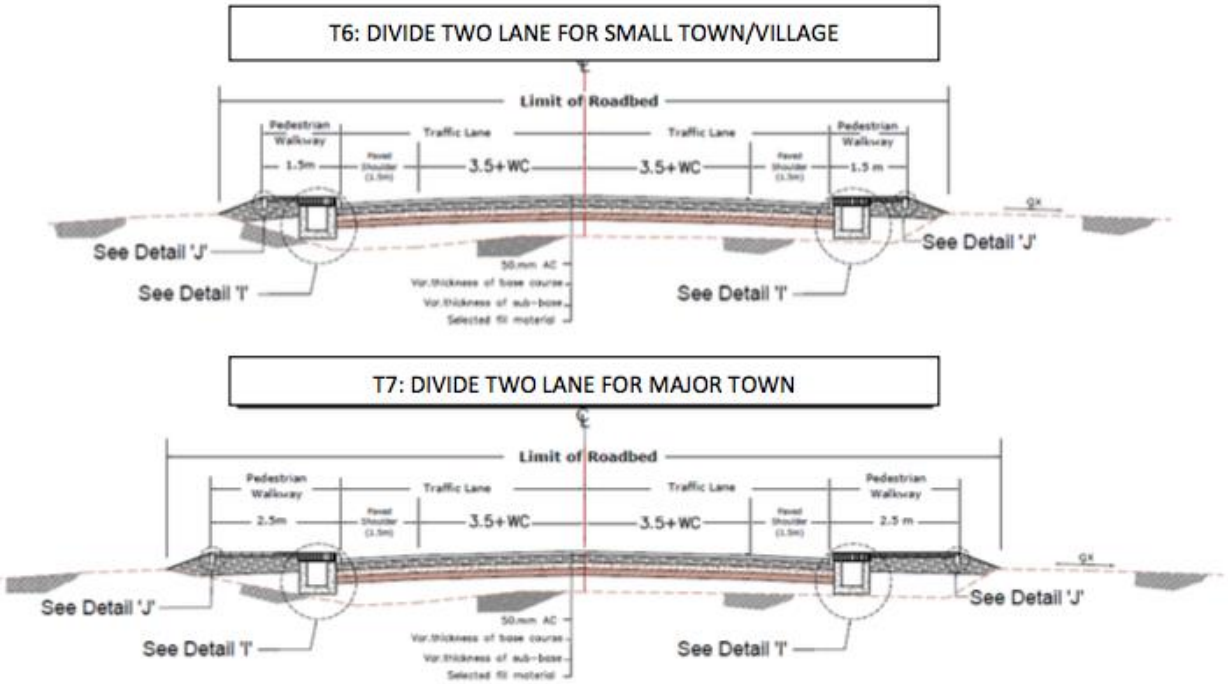

Figure 2: Urban typical sections

The design will ensure the following :

a) Reduce the earthwork quantities (namely the overall cost of the road corridor) - According to the preliminary estimation carried out by the Consultant in that sense, along the town and village road sections (listed in the following table) a likely 10-15% cost reduction can be reached.

b) Improve the Road Safety Condition by ensuring pedestrian walkways along all the urban sections (major or small contexts) and proper shoulder width for bicycle users.

Concerning the Road Safety Standard, as already highlighted above, the Consultant advises to pay particular attention at the traffic management in the next DBMC stage and road safety awareness campaign: in fact, in light of the expected heavy traffic load, the national function of the road corridor and the current use of the route by the NMT users, the probability and severity of road accidents could be widely improved.

Last but not least, the use of opening gutters (Design Detail "G" of Typical Cross Sections) along rural cut sections potentially contributes to the loss of vehicle control due to one (or more) wheel fallen down the drainage elements. For this reason, the Consultant recommends the use of carriageable iron grids or similar concrete elements.

 Include a proper number of Bus Bays along the road sections crossing the major towns. This recommendation came from the current situation highlighted by the Consultant during the site visit: indeed, the small buses and motorbike taxi currently stop within the lane width by forcing the other vehicles to overtake them occupying the lane in the other direction. The following figure shows a basic layout suggested by the Consultant at this purpose.

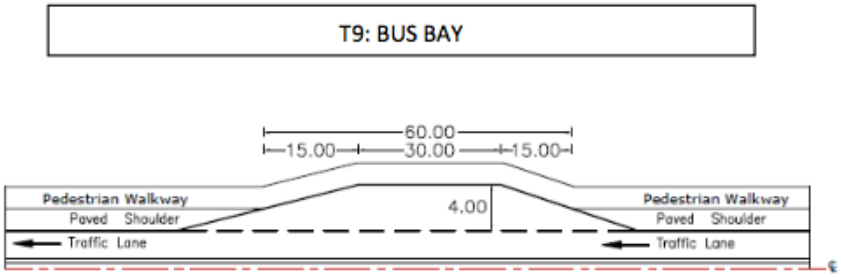

Figure 3: Bus bay

Table 1: Breakdown of urban sections

Name	Town/Village	from	to	length	Section
Lot I					
RANGO	Village	6+400.00	8+050.00	1,650.00	T6
KIRWA	Village	11+050.00	12+950.00	1,900.00	T6
RUHOGO	Town	18+200.00	19+250.00	1,050.00	T7
SAKA	Town	21+450.00	26+850.00	5,400.00	T7
GAFUNZO	Village	32+950.00	35+250.00	2,300.00	T6
GASHORA	Town	46+100.00	47+900.00	1,800.00	

Name	Town/Village	from	to	length	Section
Lot II					
KAMABUYE	Town	73+200.00	76+200.00	3,000.00	T7
KINDAMA	Town	77+850.00	82+720.00	4,870.00	T7
RUHUHA	Town	83+200.00	88+620.00	5,420.00	T7
NYAKAGARAMA	Village	89+400.00	89+760.00	360.00	T6
NYARUGENGE	Village	91+320.00	92+120.00	800.00	T6
NYARUGENGE	Town	92+500.00	93+800.00	1,300.00	T7
GIHINGA	Village	95+620.00	97+200.00	1,580.00	T6
GIHINGA	Village	97+820.00	98+500.00	680.00	T6
SHINGA	Village	99+800.00	104+500.00	4,700.00	T6
KARAMBI	Village	106+600.00	106+800.00	200.00	T6
RWARA	Village	109+200.00	109+400.00	200.00	T6
BRIQUETERIE	Village	109+960.00	110+440.00	480.00	T6
BRIQUETERIE	Village	111+200.00	111+700.00	500.00	T6
NYAMIYAGE	Town	115+410.00	116+500.00	1,090.00	T7
RWABIKA and GASORO	Town	122+150.00	128+670.00	6,520.00	T7

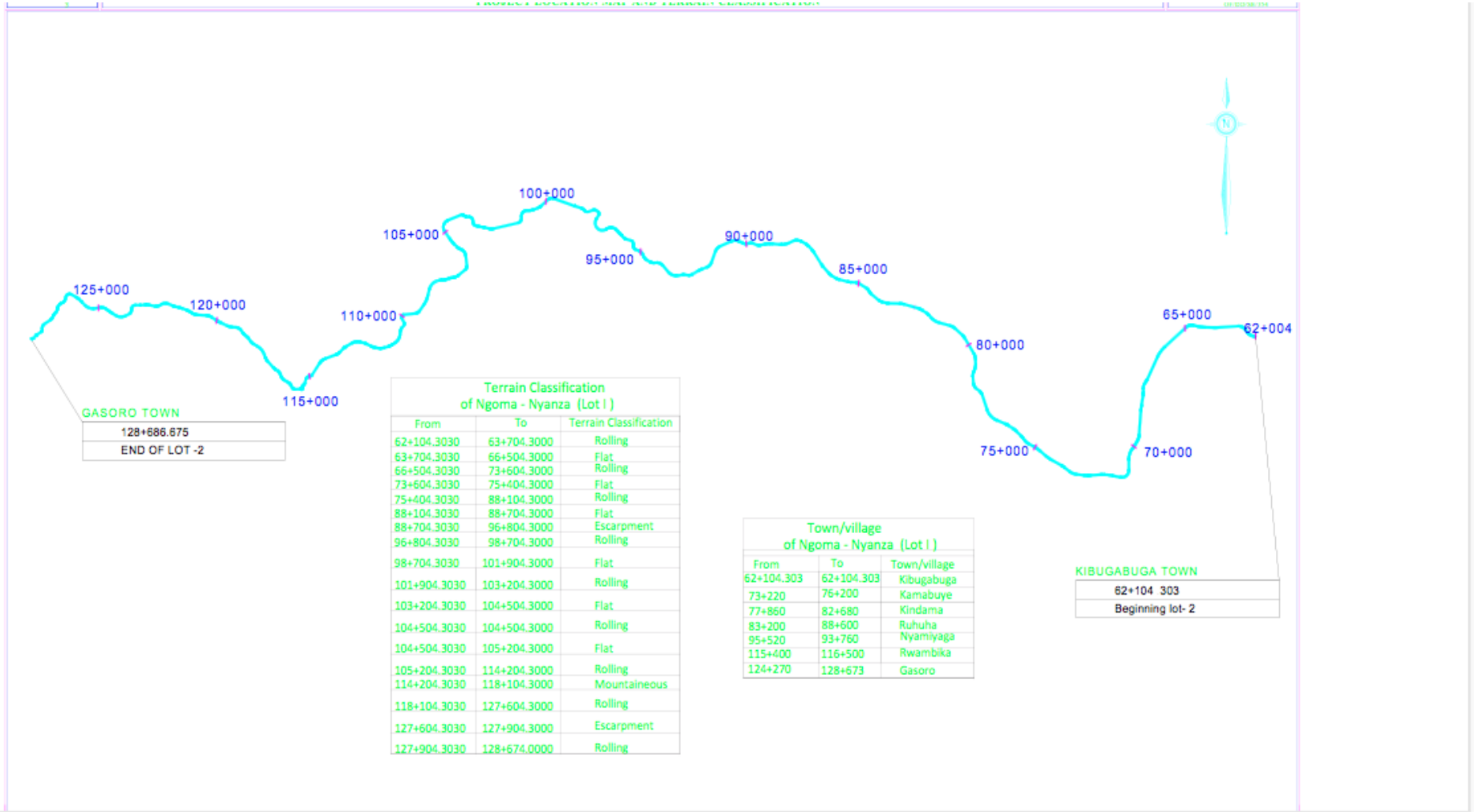

Figure 4: Project location map and terrain classification