SECOND KAMPALA INSTITUTIONAL AND INFRASTRUCTURE DEVELOPMENT PROJECT

PRELIMINARY AND DETAILED ENGINEERING DESIGN OF SELECTED ROAD LINKS AND JUNCTIONS/INTERSECTIONS TO IMPROVE MOBILITY IN KAMPALA CITY

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT

VOLUME I: MAIN REPORT

Submitted by:

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KCCA
KAMPALA CAPITAL CITY AUTHORITY
For a better City

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Preliminary and Detailed Engineering Design of Selected Road links and Junctions/Intersections to improve mobility in Kampala City: KIIDP 2

Environmental and Social Impact Statement March 2017

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LIST OF ACRONYMS

AIDS:	Acquired Immune Deficiency Syndrome
AT:	Atmospheric temperature
B.O.D	Biological Oxygen Demand
BP:	Bank Procedures
BS:	British Standards
BRT:	Bus Rapid Transport
CAO:	Chief Adminsitrative Officer
$CaCO_3$:	Calcium Carbonate
Cap:	Chapter
CBD:	Convention on Biological Diversity
CBR:	California Bearing Ratio
CGV:	Chief Government Valuer
C.O.D	Chemical Oxygen Demand
CGV:	Chief Government Valuer
DCP:	Dynamic Cone Penetration
DMM:	Department of Museums and Monuments
DWD:	Directorate of Water Development
DWRM:	Directorate of Water Resources Management
E.C:	Electrical Conductivity
EIA:	Environmental Impact Assessment
EIS:	Environmental Impact Statement
EHS:	Environment, Health and Safety
EMS:	Environmental Management Specialist
ESIA:	Environmental and Social Impact Assessment
ESMP:	Environmental and Social Management Plan
GDP:	Gross Domestic Price
GoU:	Government of Uganda
HIV:	Humane Immune Virus
IUCN:	International Union for Conservation of Nature
KCCA:	Kampala Capital City Authority
KIIDP:	Kampala Institutional and Infrastructure Development Project
KNBP:	Kampla Northern Bypass
MoGLSD:	Ministry of Gender, Labour and Social Development
MoLHUD:	Ministry of Lands, Housing and Urban Development
MoWT:	Ministry of Works and Transport
MTA:	Ministry of Tourism and Antiquities
NEMA:	National Environment Management Authority
NFA:	National Forestry Authority
NWSC:	National Water and Sewerage Corporation

NBS:	National Biomass Study
NGO:	Non-Governmental Organisation
NWQL	National Water Quality Laboratory
OD:	Operational Directives
OP:	Operational Policies
OSH:	Occupational Safety and Health
PI:	Plasticity Index
POP:	Persistent Organic Pollutants
RAP:	Resettlement Action Plan
RDM:	Road Design Manual
RH:	Relative humidity
SAICM:	Strategic Approach to International Chemicals Management
STD:	Sexually Transmitted Diseases
TDS:	Total Dissolved Solids
TSS:	Total Suspended Solids
UBOS:	Uganda Bureau of Statistics
UCE:	Uganda Certificate of Education
UETCL:	Uganda Electricity Transmission Company Limited
UNBS:	Uganda National Bureau of Standards
UNDP:	United Nations Development Programme
UNESCO:	United Nations Educational Scientific and Cultural Organization.
UNHS:	Uganda National Household Survey
UNRA:	Uganda National Roads Authority
UPVC:	Unplasticized polyvinyl chloride
URC:	Uganda Railway Corporation
US 201:	Uganda Standard 201
USD:	United States Dollar
UTM:	Universal Transverse Mercator
VIP:	Ventilated Improved Pit latrines
WHO:	World Health Organization

Units:

CFU:	Colony Forming Unit
Db:	Decibel
Mg/L:	Milligrams per litre
Mg:	Milligrams
NTU:	Nephelometric Turbidity Unit
^{o}C:	Degrees Centigrade
ppm:	Parts per million
µS/cm:	Micro Siemens per centimetre
µg/m^{3}:	Micrograms per cubic metre

EXECUTIVE SUMMARY

Introduction

Traffic congestion in Kampala city is fast growing due to a combination of poor roads network, uncontrolled junctions, and insufficient roads capacity which is out of phase with the increasing traffic (vehicular and pedestrian) on Kampala roads. This congestion results into higher vehicle operating costs, long travel times and poor transport services. The overall city aesthetics and quality of life is highly compromised by the dilapidated paved roads and sidewalks, unpaved shoulders and unpaved roads which are sources of mud and dust that hovers over large sections of the City.

The Government of Uganda through Kampala Capital City Authority (KCCA) with support from the World Bank intends to improve mobility in Kampala City through improvement of selected road links and Junctions/intersections. The selected junctions/intersections are to be signalized while the selected roads are to be dualled or reconstructed or upgraded to paved standard.

The National Environmental Act, CAP 153 requires that an Environmental Impact Assessment (EIA) is undertaken for all projects that are listed under the third schedule of the Act with a view of sustainable development. The proposed project is one of the projects listed under Section 3 (Transportation) of the Schedule. Therefore, to fulfill legal requirements an EIA has been conducted for the proposed project as part of the consultancy services for the preliminary and detailed engineering design of selected road links and junctions/intersections to improve mobility in Kampala City under the Second Kampala Institutional and Infrastructure Development Project.

The proposed project is proposed to be undertaken within a heavily urbanized environment characterized by built up areas and a few natural areas that could be affected by implementation of the project. Therefore besides fulfilling legal requirements, the ESIA is being undertaken to ensure that the project is implemented in such a way that there is little or no adverse impact on the physical, biological, cultural and socio-economic attributes of the environment of the proposed project area.

SMEC International Pty Ltd in association with Newplan Limited has been contracted by KCCA to carry out the consultancy services for the preliminary and detailed engineering design of selected road links and junctions/intersections to improve mobility in Kampala City inclusive of the ESIA. This report therefore presents the findings of the ESIA.

Objective, Scope and methodology of the ESIA

The general objective of the ESIA was to identify and assess the potential environmental and social impacts of the proposed project with a view to eliminate/minimize the negative impacts.

The scope of the ESIA was guided by provisions in the first schedule of the EIA regulations for Uganda and the approved terms of reference for the study, as well as international guidelines such as the World Bank Safe Guard Policies.

A number of methods were applied during the ESIA. These included literature review, stakeholder consultations, field baseline surveys and impact analysis. Literature reviewed included project design reports, Kampala district reports and international guidelines on ESIA. Field baseline surveys covered the physical environment (hydrology, geology and soils, noise and air quality), the biological environment (fauna and flora), the social-economic environment and the cultural environment. The methods used for the field baseline surveys varied with discipline. Stakeholder consultations were done at community, division/sub County, district and national level through meetings, questionnaire guided interviews, and Focus Group discussion with selected stakeholders. The methods used to identify relevant stakeholders included: purposive selection, brainstorming, snow ball method and use of previous projects conducted in the same area.

The potential positive and negative environmental and social impacts of the proposed project were identified, evaluated and their significance determined. Assessment of the impact significance was based on a combination of the value of the affected environmental component and the magnitude of the potential impact. The value of the affected environment was measured on a scale of low to high. The value scale given was based on established value and conservation criteria as well as indications of regional and local importance. The magnitude of the potential impact was measured on a scale of "large positive" to "large negative". The magnitude scale given was based on severity, time (duration) and space (site-specific, local, regional, national, international) as well as probability/risk of the impact to occur. The significance level of the impact was then measured on a scale of "very large positive" to "very large negative".

Project description

Location

The selected project roads/junctions are divided into Group 1 and Group 2 as shown in Appendix VI. Group 1 roads and junctions are to be improved before those under Group II. Except Kabuusi-Kitebi-Bunamwaya road and Ssuna road-2 that are located in Wakiso District in Makindye Ssabagabo Sub County, all the project roads and junctions are located in Kampala District in all the five divisions, Kawempe, Central, Nakawa, Lubaga and Makindye. The location of each selected road/junction is presented under Table 14, Appendix VI and Appendix VII.

Project components

The project comprises the roads and junctions to be improved. Support infrastructure/ancillary components include quarries and borrow areas, sand sources, construction water sources, project equipment/material storage areas, workers' accommodation sites, access roads, and a traffic control centre linking all signalized intersections.

Inputs and outputs

Equipment to be used during the project construction period includes graders, rollers, trucks, excavators and asphalt pavers. Materials to be used include Crushed rock for base layer, concrete aggregate and asphalt, Sand for concrete, Gravel for layer works, Water for construction, and Cement.

One of the major outputs of the project will be waste generated during the construction activity. Expected waste to be generated will comprise of Concrete and brick rubble, Old pipes, Spoil material (gravel and soils) and Asphalt (mostly reworked into new layer works). Most spoil material will be disposed of at the municipal dump disposal sites

Activities

The project will generally involve the following activities;

- Signalisation of selected junctions
- Reconstruction and dualling of selected roads
- Reconstruction (recycling and overlaying/upgrade to concrete) of selected roads
- Upgrading of selected roads to paved standard.
- Ancillary works including street lighting

Preconstruction activities some of which are already ongoing include Construction Material Investigations, Surveying, Road inventory, Traffic and other data collection, Land Acquisition, Recruitment of labour and Design work

Construction activities will include land Clearance, top soil removal , drainage works, earth works, borrow pit operations, quarry operations, road surfacing and ancillary works such as kerbing, pipe laying, hauling, road markings, placing of road signs and guardrails and street lighting.

Post construction activities involve mainly the roads' operation and maintenance activities carried out by the developer in order to ensure optimization of road operations. It includes both routine and periodic maintenance works. Routine maintenance works include pothole patching, cleaning of drainage items, repairs of broken road items including maintenance of street lights, among others. The periodic maintenance items are carried out after a scheduled period of time. These include re-

sealing, re-painting of road markings, among other activities. Other post-construction activities include enforcement of road rules and other control requirements.

Project Land Requirement

The project will require small amounts of land take outside the existing road corridors for roads to be expanded. The total land take of the project will be established following completion of the detailed engineering design stage of the project. It is a project requirement to take as little land as possible, so as to minimize the cost of land procurement.

Project status and duration

The project is currently in its final engineering design phase, the Environmental and Social Impact Assessment and Resettlement Action Plan having been completed. Construction is expected to commence in May 2017.

Project Cost

The total cost of the project will be established following completion of the detailed engineering stage of the project and Resettlement Action Plan. However the estimated construction cost for Group I roads that are to be upgraded first is USD 104 940 752.70.

Project labour

The project will employ a number of workers both skilled (about 230) and unskilled (about 320) in positions such as, road engineers, project supervisors, Environment Health and safety officers, potters, security guards etc. The actual number of workers will be determined by the selected contractors. Measures are proposed in this report on ensuring equitable access to job opportunities for Ugandans.

Baseline conditions of the project area

Climate

The selected roads and Junctions are characterized by the climate of Kampala and Wakiso Districts where they are located. Kampala district has a mean rainfall of at least 50mm in every month with January and February being drier than other months. The district has considerably high temperatures with an annual average of 21.9°C. Temperature peaks are in the months of January to March and October to December, the former being higher. The annual rainfall mean in Wakiso District is 1320 mm. The minimum surface air temperature in Wakiso District is 11.0 degrees centigrade while the maximum is 33.3 degrees centigrade.

Geology, soils and topography

The selected roads and Junctions' area being located in Kampala and Wakiso Districts are characterized typically by Kampala and Wakiso District topography and geology described below. Kampala District is underlain majorly by the pre-cambrian rock system. The soils of Kampala district are ferralitic representing an almost final stage of weathering with little or no mineral reserve left. Wakiso District landscape lies at an approximate range of about 900 to 1340 meters above sea level. The district is characterized by isolated flat-topped hills with steep slopes, often merging abruptly into long and gentle pediments, which are usually dissected by relatively broad valleys. Wakiso District is underlain by both old and recent rock systems, which include Precambrian, Cenozoic and Laterites. The soils in Wakiso District are generally of high productivity and are mainly sandy clay soils.

Results from Soil surveys undertaken at the roads indicate that most of the roads comprise fine-grained sandy clays which have Plasticity Indices (PI) between 15 and 20. The materials can generally be classified as intermediate to low plasticity clays. Penetration rates on Old Port bell, Port bell, Kayemba, Eighth Street, Lukuli and Kulambiro Roads showed several values below 10%, which probably indicate soft spots in the underlying layers.

Hydrology

Kampala city is built on a number of hills with a topography controlled by differential weathering of various grades of sedimentary bedrock types. The topography results in thin weathered mantles of limited extent which produce shallow, localized groundwater flow systems with relatively short residence times (ARGOSS, 2002). Kampala city has a shallow aquifer from the weathered regolith. The springs that arise from the shallow aquifer are the major source of groundwater supply within the city. Springs supply about 50% of Kampala's population with the majority of these occurring in high-density settlement areas. 16% (32km^2) of Kampala district is covered by wetlands. These wetlands are part of the Lake Victoria catchment and the Victoria Nile catchment which encompasses major wetlands like the Lubigi and Nalubaga wetlands. Many of the wetlands in Kampala occupy shallow valleys between the many hills within the district.

Wakiso District is generally endowed with adequate surface and sub-surface water reserves with numerous streams, rivers and wetlands both permanent and seasonal. Minor valleys have distinct seasonal swamps and rivers, which contain water especially during the wet season. The water table along these swamps is quite high. They are suitable for sinking shallow wells. Sub surface water reserves occur in fissures and aquifers of the rocks. This is indicated by the number of boreholes, spring wells, tube wells and shallow wells, which have been drilled to harvest water for domestic supply (Mpigi District Local Government, 1997).

There were wetlands observed along Wamala, Ssuna II, Muzito, Kirombe, Tuba, Kulambiro – Najeera, Port bell, Ntinda-Nakawa and Mugema roads. The wetland by Wamala road joins Nalukolongo stream that flows into Lubigi Wetland. The wetland is still quite intact. The wetlands by SSuna II road and Muzito road join Lufuka stream, Kaliddubi swamp, Kawagga swamp before joining Lake Victoria. The wetland by Kirombe road drains into Lake Victoria. The wetland by Tuba road is fed by Nalubaga stream crossing the wetland which eventually ends in Lake Victoria. The stream observed on both sides of Nakawa-Ntinda road joins Kinawataka stream that eventually joins Lake Victoria.

Water quality

The water sources along the project roads that will be affected by the project activities include springs, streams, water channels, wetlands and the Lake Victoria.

Almost all the wetlands are already deemed degraded to some extent (Kampala District Local Government, 1997). Protected springs are susceptible to pollution related to anthropogenic activities even when notionally "protected" (KSSMP, 2004). Previous studies undertaken on the protected springs in Kampala indicate widespread faecal contamination (Howard *et al*., 2003; Barrett *et al*., 2000 and Barrett *et al*., 1998). These findings demonstrate microbiological contamination to be most severe during rainy (recharge) season. It is observed that the principal route of contamination of the protected springs is the immediate surrounding area and that localized sources of pollution are the major contributors to groundwater quality deterioration.

The contamination sources of the springs and surface water sources in Kampala are noted to result from solid waste dumps, low coverage of excreta disposal facilities (pit latrines) resulting in indiscriminate disposal of faecal matter into the environment (drainage channels, solid waste dumps and surface water), stagnant surface water due to inadequate management of storm- water runoff, and domestic animals such as goats, cows, pigs and chicken especially in the low income peri-urban settlements. Rainfall in this case is the primary climatological control factor, as it will aid both the washing in of contaminants to the backfill area and replenishment of the contaminated surface waters.

An analysis of the physical-chemical and biological water parameters from the identified water sources along the project roads showed that the quality of water from all the water sources except a community spring on Wamala Road, was not good for human consumption because of very high bacterial load and total suspended solids.

Nosie

Results from the noise assessment undertaken along the project roads and junctions indicated that in trading centers and markets, noise levels were above the permissible levels set as per National

Environment (Noise Standards and Control) Regulations, 2003. This was mainly due to noise sources such as human conversation around the area, music in the nearby shops and vehicular movement.

Air quality

Air quality measurements obtained from the air quality assessment at selected points (Appendix IV) along the project roads and junctions were compared with the air quality standard for World Health Organization (WHO). Generally the concentration of Particles of 2.5µm diameter for most of the sampled points along the roads and junctions, were within acceptable limits and PM levels were above the WHO air quality guidelines thus air quality will definitely deteriorate during construction phase. Particulate emissions for areas around the unpaved roads were above the recommended air quality standards for World Health Organization. This was mainly due to dust generated by moving vehicles on the murram roads. However, in areas near the murram roads, for which measurements were taken on a rainy day, particulate levels were within acceptable limits even when the vehicles were moving on the roads.

Flora

The vegetation of Kampala District has been studied by the National Biomass Study (NBS) within the Uganda Forest Department dividing it into six major classes; Vegetation in Built-up Areas, Subsistence Mixed Farmlands, Woodland, Bush land and Wetland (Kampala District Local Government, 1997).

One or more and for some roads, all of the above stated vegetation cover types was/were observed during the vegetation survey along the project roads and junctions. "Vegetation in built up areas" that included shade, fence, ornamental, fruit, compound and road edge species was the most common observed on all the roads and junctions. Accordingly plant species falling under this category of vegetation "(Vegetation in built up areas") were the most common. These included *Persea americana, Markhamia lutea, Thevetia peruviana, Mangifera indica, Roystonea regia, Ficus benjamina, Jacaranda mimosifolia, Tabebuia rosea, Acalypha wilkesiana, Bougainvillea glabra, Duranta repens, Grevillea robusta, and Sapium ellipticum.*

With regard to lifeform, majority of the plant species observed by majority of the roads and junctions were herbs

A total 12 Species of conservation concern were observed along the roads and junctions. The species include those appearing on the IUCN red list and NFA reserved species list. These include *Brugmansia suaveolens, Jacaranda mimosifolia, Canarium schweinfurthii, Juniperus procera, Canarium schweinfurthii Milicia excelsa*, *Khaya anthotheca*, *Podocarpus* sp, *Maesopsis eminii, Hallea rubrostipulata, Hallea stipulosa and Tamarindus indica.*

Some major invasive species were observed on some of the roads and junctions. These included *Lantana camara* and *Mimosa pigra.*

Fauna

The destruction of good faunal habitat such as big trees, thickets and bushed grassland is a continuing process and this has left limited suitable habitat in the Kampala area. Due to these changes in habitat structure, certain species especially of birds have become more urbanized in recent years and are now established in many Kampala gardens. These include the popular Marabou Storks, cattle Egret, Open-billed Stork, Woodland Kingfisher, Grey-backed Fiscal, Ruppell's Long-tailed Starling and Red-chested Sunbird among other species (Carswell 1986).

The Mammals on the other hand have suffered differently with most, if not all, of the large mammal populations disappearing from the area. The modification of the habitat has made it rather suitable for only the smaller mammals to come in, especially the Chiroptera (Bats), Soricomopha (Shrews, moles) and Rodentia (Rodents).

The fauna survey reported on mammals and birds as per the approved ESIA terms of Reference. No mammals were observed along the roads and junctions. However a number of birds were observed in the surroundings of the project roads and stand-alone junctions except at Kabalagala junction where no birds were observed. The commonest birds observed in the surroundings of the roads and junctions were Hadada Ibis, Pied Crow, Common Bulbul, Ruppel's Starling, Black Kite, Cattle Egret and Red-eyed Dove. A number of Species of conservation concern were observed in the surrounding of the roads. These included the Splendid Starling, Black and White Casqued Hornbill, the African Openbill Stork, White-throated Bee-eater, Grey Parrot, Lizard Buzzard, Little Greenbul, Blue-spotted Wood Dove, Ross's Turaco, Barn Swallow, Black Kite, Woodland Kingfisher, Lizard Buzzard, Red chested Sunbird and White-headed Saw-wing, Shikra, Long-crested Eagle, Ross's Turaco, Black & White Casqued Hornbill.

Population

According to the provisional results of the Housing and Population Census 2014, the population of Kampala by Division stands at 1,516,210 persons of which 722,638 are males and 793,572 are female. The number of households was estimated at 418,787. Wakiso District has a population of 2,007,700 persons of which 952,781 are male and 1,054,919 are female. Makindye Sabagabo Sub County has a population of 284,067 persons of which 133,079 are male and 150,988 are female. The average household size is 3.5 and 3.9 for Kampala and Wakiso respectively which are both lower than the national average of 4.7. Results of the households survey carried out on all the proposed roads indicated that the average household size along all the roads was 5.5 persons.

Literacy

The socioeconomic findings further indicated that 82.6% of the households along the project roads could read and write in the English language while 88.3% could read and write and in any local language.

Ethnic composition

The proposed roads and junctions are located in Kampala the capital city of Uganda which is inhabited by ethnic groups from all over Uganda. There are also ethnic groups from other neighboring countries such as South Sudan, Kenya, Tanzania, Rwanda, Burundi and Democratic Republic of Congo among others. The project area is also inhabited by expatriates from other continents other than Africa. However, the most dominant tribe is the Baganda. The Luganda language is widely understood by most of the residents along the project roads.

Land use and land tenure

Land along all the project roads is mainly used for residential and commercial settlements. Agricultural land use is very limited. Majority (69%) of the households owned titled land with a sizeable number (30%) owning land under Kibanja system. Out of the interviewed households, 0.1% claimed to own land under customary and communal systems

Economic activities, income sources and employment

Majority (39.3%) of the households along the project roads are in formal employment while 39.6% are in trading in various items. The rest obtain income from boda boda riding, taxi/special hire driving, artisanal skills (welding, carpentry, tailoring etc.), farming, casual labour, and remittances from rentals, family or pension. With regard to employment, in Kampala district, the majority of the people are either directly employed in organizations or are self-employed. These organizations range from business conglomerates, construction, financial, energy, food and beverage, manufacturing, foreign exchange bureaus, hotels, mass media, telecommunication, transportation and consultancy among others.

Settlement Pattern, nature and type of buildings

Kampala is a city with a lot of diversity in settlement patterns and building types. Settlements along the proposed road links and junctions are linear in nature and congested in most of the areas. Most of the buildings in the project areas are of permanent nature. Temporary structures along the road are mainly in form of kiosks and market vending stalls. Settlements are comprised of both residential and commercial buildings.

Most of the project areas are located in un-planned neighborhoods with disorganized housing patterns. Examples of such areas include Calender Rest 1 junction and Namasole/Busabala junction, Kayemba road, Ssuna II among others. Well planned settlements were found along sections of Sentema road, Nakawa Ntinda and other roads in the Central Business District. Commercial structures are close to the roads while residential structures are located a bit further for most of the roads. Settlements also include public structures like schools and churches.

Transport and Communication

Both Kampala and Wakiso Districts are vibrant areas with transport facilities including taxis, buses, personal vehicles, motor cycles commonly known as boda bodas and bicycles. The roads are also used by heavy trucks and lorries transporting all kinds of goods. Pedestrians including school children are also a common sight along the Kampala and Wakiso roads. The nearby port at Port bell in Luzira is also a major link for transporting passengers and goods from Kampala to other parts of Uganda and the East African region. Road transport is the main means of transport within the two districts.

The proposed road links and junctions are currently in fair to poor condition. Some of the roads are paved but will require rehabilitation, others are paved but narrow and will require dualling while others are unpaved and will require upgrading to paved state.

Communication companies such as MTN, Airtel, Warid Telecom, Smile Telecom, Africell, Telecom etc. provide Kampala and Wakiso residents and visitors with mobile communication services, internet services and all related communication services. Several telecommunication masts were observed along some of the proposed road junctions.

Water and Sanitation

National Water and Sewerage Corporation is the main service provider of water and sewerage services in the two districts. Some households and institutions also practice rain water harvesting such as St. Peters S.S. Nsambya. A few households were noted collecting water from springs e.g. along Wamala road. NWSC water is accessed through house connections and yard tap connections. Households without house connections access water through buying from those with yard tap connections.

Poor garbage disposal was noticed on quite a number of the project roads where garbage was littered anyhow along the roads. However, on some roads KCCA trucks or private trucks were noticed collecting the littered or heaped garbage along the roads. 99.8% of the households along the project roads had access to toilet facilities. Out of the households with access to toilet facilities, 45.1% use the traditional pit latrine.

Education

There are quite many schools located along almost all the roads most of which are private primary school. There are also high institutions of learning that are found on some of the roads e.g. Kampala University of Nursing and Health Sciences along Wamala road, Ndejje University along Sentema road and Multitech Academy along Sir Apollo Kaggwa road.

Health

Along the project roads, several health facilities mainly privately owned were noted. Some of the health facilities that residents along the roads use include St. Francis Nsambya Hospital in Makindye Division (which is in the vicinity of Hanlon-Nsambya Junction), Mulago National Referral Hospital in Kawempe Division, Mengo Hospital, Kitebi Health Clinic in Lubaga Division, Kampala Capital City Authority Clinic Kisenyi Health Centre in Central Division, Komamboga and Naguru Hospital in Nakawa Division.

With regard to diseases, malaria is the most common disease as reported by 54.3% of the households along the project roads.

Vulnerable groups

Like any other society, there are vulnerable groups along the project roads such as the female headed households, household headed by the disabled, the elderly, children and people living with HIV/AIDS etc. The socioeconomic household survey carried out along the proposed roads showed that 20.3% of the households have an orphan in their homes, 6% of the households have a disabled person in the home, 28.3% of the households are headed by females and 5.5% of the households are headed by the elderly (65 years and above).

Gender

74.3% of the male household heads' wives did not own land. However, 41.3% said that their wives were allowed to make decisions on issues regarding land. With regard to different roles of men and women, in the urban areas many women have to a large extent taken up the role of looking after the family in every sense of the word e.g. paying school fees, providing medical care, buying food in addition to household chores. Women have thus taken up all kinds of work in order to fulfil their current family obligations. They are engaged in trade, urban farming, casual labour, wage employment and formal employment.

Non-Government Organisations

There are quite a number of non-government organisations with offices along the project roads. These include Cornerstone Development Uganda, International Union for Conservation of Nature

(IUCN), Africa Centre for Global Health & Social Transformation and Katalemwa Cheshire Home for Rehabilitation Service

Physical and cultural resources

The physical cultural resource survey revealed no declared or recorded archaeological sites and paleontological remains within the project area (selected roads and junctions). Cultural related affairs identified within the project area 2 shrines, owned by individuals. One is located at 36N 0452288 UTM 0045015 at Buwambo - Kitezi road (*Kawempe*) 25 metres from the road. Another found at 36 N 0454894 UTM 0032184 at Kirombe road (*Makindye)* approximately 15 metres from the road. Other culturally sensitive sites identified within the project area are burial grounds approximately 10 metre distance from Buwambo - Kitezi road.

Analysis of Alternatives

There are a number of project design alternatives. The alternatives were analysed in respect to potential environmental and social impacts, financial and technical issues. The principle used in the choice of alternative was to minimize both the environmental and social impacts, technical challenges and the cost of construction. In some cases however the preferred alternative following the analysis was not the alternative proposed for implementation by the design engineer. Justification for not selecting/proposing the preferred alternative following the analysis was given as required under section 4.1.1.2 of the Guidelines for Environmental Impact Assessment in Uganda.

Pavement material options for higher order roads

Two material options were proposed for the base layer and sub base layers for higher order roads. These are;

Material	Layer
Option 1: G45 gravel (CBR 45%) Vs. Option 2: G80 Crushed aggregate	Sub-base layer
Option 1: Crushed rock vs. Option 2: bitumen base	Base layer

Option 1: G45 gravel (CBR 45%) is the recommended option because of its minimal environmental and social impact and technical advantage and has been selected for implementation.

Option 2: bitumen base is the recommended option because of its minimal environmental and social impact and technical advantage over option 1: crushed rock and was proposed for implementation.

Material thickness for high order roads

Different material thicknesses were proposed for the higher order roads as follows;

Thickness	**Material**	**Layer**
150mm (Option 1)Vs. 225-300mm (Option 2)	G45 gravel (CBR 45%)	Sub-base layer
150mm (Option 1) Vs. 175-200mm (Option 2)	Crushed rock	Base layer

Option 1: 150mm for both Sub base layer G45 Gravel (CBR 45%) and Base layer crushed rock are the recommended options since they would have minimal social impact, reduced construction costs and period. They were the options required by the developer. However the design consultant has proposed option 2 for implementation following the Road Design Manual (RDM)

Traffic Accommodation

Accommodating the high volumes of vehicles on almost all the roads to be upgraded will be a major challenge on this project. Two options have been proposed;

1. Closing off sections of roads to allow for unimpeded construction.
2. Means of stop/go conditions in partial-width construction

"Option 1: Closing off road sections" is the recommended option because of minimal social impact and interruption to construction. However both options are proposed for implementation. Option 2 would be used where option 1 is not possible such as in situations of no road diversions.

Road classification

Two options of Road classification were proposed for Kayemba road; Arterial Road (4 Lanes) and Local Road (2 lanes).

Option 2: Local road (single carriage way)" is the recommended option because of minimal social impact, reduced construction period and cost. It is the option proposed for implementation.

Typical cross sections

Three options of typical cross sections for the roads' upgrade have been proposed;

1. Full Typical Cross Sections

2. Reduced (1.5m) Typical Cross Sections
3. Reduced (1m) Typical Cross Sections

"Option 3 Reduced (1m) Typical Cross Sections" is recommended because it would have minimal environmental and social impact, lower construction cost and period. However the final cross section implemented on each of the roads combines features of each of the above three options, based on available roadway width and road user requirements (refer to Table 10).

Geometric design elements

Two options were considered for each of the design elements in column 1 of the table below.

Design Element	**Urban/Peri-Urban Option 1 (standard)**	**Urban/Per-Urban Option 2 (revised)**
Design speed	50	30-70
Minimum passing sight distance	345	140
Minimum horizontal curve radius	100	60
Maximum super elevation	4	3
Crest Vertical Curve passing	126	20
Shoulder cross-fall	4	2.5

Column 2 presents standards as per the MoWT General Specification for roads and bridge works the design standard required to be used for the project while column 3 presents revisions proposed by the design engineers.

Option 2: Urban/Per-Urban (revised) is the recommended option because it would have minimal environmental and social impact and has a higher technical advantage. The option has been proposed for implementation.

Number of underpass structures on Kayemba road for upgrade

There are two alternatives, one is to upgrade the two underpass structures on Kayemba road one under queens way and the one under the railway line. The other option is to upgrade only the one under the railway line.

Option 2: Upgrade of only the underpass at the railway line is the recommended option because it would have minimal environmental and social impact and lower construction cost. It is the option proposed for implementation.

Design options for the upgrade of Kayemba road

A number of design options have been proposed for the upgrade of Kayemba road as follows;

Design Option 1: Re-grading Kayemba Road under the Rail Line and Queen's Way

This option considers a substantial re-grade of Kayemba Road. The Consultant proposed a vertical clearance standard of 5.2m.

Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way

This option is based on Option 1 above .The proposed vertical clearance standard of 5.2m is reduced to 3.5m.

Design option 3: Re-grade Kayemba Road over the railway line and Queen's Way

This option entails the re-grading of Kayemba Road over the rail line, as well as over Queen's Way.

Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way (Option 4)

Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way is the recommended option from an overall perspective (environmental, social, technical and financial). However the option was not considered to be viable due to the following:

- The development of the proposed Bus Rapid Transport (BRT) route on Queen's Way will render the at-grade intersection layout unusable, resulting in fruitless and wasted expense;
- At-grade rail crossings are considered dangerous as road users in Kampala are not known to adhere to the road rules regarding level rail crossings.

The next best option as per the score table above is Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way which has been proposed for implementation.

Bridge design options

Two existing road bridge structures are to be upgraded under the project, the one on Kayemba and the one on Port bell road.

Bridge structure at Port Bell Road

There are two options for the bridge structure to be constructed on Port bell road;

1. Portal structure
2. Precast Beam and Slab Structure

Option 2: Precast Beam and Slab Structure is the recommended option because of minimal social impact and a higher technical advantage. It is the option proposed for implementation.

Bridge structure at Kayemba road

There are three options for the bridge structures to be constructed on Kayemba road

1. Portal structure (Option 1)
2. Portal structure (Option 2)
3. Portal structure (Option 3**)**

Portal structure (Option 1)

This option considers construction of the portal structure on the side of the railway line and to jack the structure into position.

Portal structure (Option 2)

This option will require that the railway line be relocated to a new position next to the existing position. A temporary portal structure will be built next to the existing structure, after which the railway line will be relocated to this structure. The existing structure can then be safely demolished. Then the new portal structure will be constructed, and when it is finished will the railway line be put back in its place. After that the temporary portal structure will be demolished.

Portal structure (Option 3)

This option is based on Option 2. A portal structure will be designed to be built in two halves. The first half will be built in position, after which the railway line will be relocated to this portion of the structure. The existing structure can then be safely demolished. Then the second half of the portal structure will be constructed, and when it is finished will the railway line be put back in its place.

"Option 3 is recommended from an overall perspective (Social, technical and financial). It was the option selected for implementation in consultation with Uganda Railway Corporation (URC)

Road lighting design options

Solar powered lighting and hybrid-powered system is to be used for the project roads. The battery box housing is to be manufactured from powder-coated corrosion proof 3CR12 steel and shall be of suitable size to house the regulator and battery. Two options have been provided for positioning of the solar battery box housing.

1. Underneath the solar module
2. Underground

Option 1: Underneath the solar module" for positioning of the battery box is the recommended option from a technical point of view and was proposed for implementation.

No action (No project) scenario

The no project (no-action) alternative was also analysed. It was considered not a desirable alternative. This is because the benefits expected from the project such as employment opportunities, improved mobility of vehicles and reduction in dust levels would not be realized yet the adverse impacts associated with the Action scenario are mitigable.

Policy, Legal and Institutional Framework

A review of policies, laws and institutional framework was carried out. The national policy, legal, regulatory and institutional framework pertinent to the proposed project and to which the developer should comply, as well as International policies, guidelines and standards are discussed. Relevant international agreements and conventions to which Uganda is a signatory are documented.

Public consultation

Public consultation and sensitization commenced in the month of May 2015 at the scoping phase and continued throughout the detailed phase of the study i.e. in the months of June, July, August, September and October 2015. Several stakeholders at national, local government and community levels were consulted. At national level some of the stakeholders consulted included Kampala Capital City Authority (Client), Ministry of Gender, Labour and Social Development (MGLSD), UMEME Limited, Uganda Museum, Department of Historical monuments, Ministry of Tourism, Wildlife and Antiquities, Nature Uganda, Department of Wetlands and MTN. At the local government, both the technical and political leaders were consulted. The following are some of them that were consulted Environmental Officers for the respective divisions, Town Clerks for the respective divisions, Mayors for the respective divisions, Deputy Mayors for the respective divisions, Councilors for the respective divisions, Chairperson Eng./Physical Planning & Education/Social Services, Division/Ward Administrators, Community Developmental Officers in the respective divisions, District / Division Engineering Department, KCCA Environment and Resettlement Action Plan Division, Sub County Chief Makindye Sabagabo, Chairpersons and Vice Chairpersons, LC IIIs etc. In addition, communities along the respective roads, special interest groups such as the women and boda boda riders, non-governmental organisations, health facilities and educational facilities along the roads were consulted.

A number of issues / concerns were raised by the different stakeholders. These include among others the following;

National stakeholders

- Design of lanes and zebra crossings to allow movements for vulnerable people.
- Development of a safety and health plan by the contractor.
- Proper management of traffic to avoid accidents.
- Provision of water, First Aid kits, resting places to the workers.
- Historical buildings and monuments should be conserved to avoid losing their aesthetic value.
- UMEME infrastructure that will be damaged will require restoration.
- The road reserve should be used for tree planting to conserve the biodiversity and the beauty of the city.
- Community health and safety should be given due respect.
- Notify the Chief Technical Officer about the proposed project roads through formal communication requesting for support before relocation of the cables.
- Work closely with MTN engineers during the relocation process for technical guidance and support to minimize possibilities of damages to the cables.

Local government stakeholders

- Compensation of project affected persons.
- The designs should cater for walkways and pedestrian lands.
- Drainage channels and manholes should be covered to avoid accidents.
- Provide employment opportunities to the local people especially casual labourers.
- Involvement of National Water and Sewerage Corporation and UMEME is key.
- Provide drainage system for the design.
- Good quality materials should be used during the construction of these roads.
- The water logged areas should be taken care of from planning stage.
- Widening of some roads should be given considered for example the Sentema road.
- The roads must be covered with a firm surface for travel such as paving stones or concrete.

Communities along the roads

- There is always undervaluation of affected property.
- Compensation of tenants / kibanja owners versus land owners.
- Impact on water pipes and electricity lines.
- Compensation of deceased PAP's property.
- Should not evict anyone without compensation.

- There is need for formal designation of boda boda stages.
- Install humps to regulate speed.
- Provision of alternative routes during construction.

Institutions (NGOs, education and health institutions)

- Destruction of property, interruption of activities and blocking access to premises close to the road.
- Noise pollution , increased accidents , increased traffic jams and loss of clients are some of the impacts expected that should be mitigated
- Put Zebra crossings and road signs in busy areas especially where there are schools.
- Put humps along the roads to reduce the risk of accidents.
- Contractor should be careful not to destroy underground water pipes.

Potential significant impacts

The project will be associated with both positive and negative impacts with varying levels of significance. Measures to enhance the positive impacts and mitigate the negative impacts have been proposed. The table below shows the predicted major positive and negative impacts and the measures proposed to enhance or mitigate them.

Impact	Proposed mitigation/enhancement measures
Socio-economic impacts	
Positive impacts	
Better standards of living	Adequate compensation to enable better standards of living for project affected persons.
Negative impacts	
Anxiety generated by disclosure of information to the Community	To reduce on the anxiety, all information regarding the project and land acquisition and compensation will be thoroughly disseminated to the community especially during the preparation of the Resettlement Action Plan and any other relevant project information throughout other phases of the project so that all fears, anxieties and queries are answered, reduced or eliminated. During the RAP preparation and implementation phases, information about land take and acquisition will be disseminated to the right people e.g. family members – property owners, spouses, children etc.
Biophysical impacts	
Positive impacts	
- (None)	
Negative impacts	
-	
Construction phase	
Socio-economic impacts	
Positive impacts	
Direct employment opportunities	• Timely and continuous information dissemination about the existing job opportunities and any other opportunities besides the jobs such as sourcing of materials and supplies. The contractor will use effective communication methods so as to ensure that the message reaches the intended people (See section in Baseline Chapter under communication, with recommendations on communication channels with radio, television networks and newspapers that reach a wider section of the population). • The contractor will present a transparent Worker's Recruitment Plan. The recruitment procedures must provide equal opportunity for all including females. The Plan will be clear on the working conditions and terms of employment. • Employment opportunities will be extended to the interested people along the different roads.

Impact	Proposed mitigation/enhancement measures
	• The Contractor will prepare and implement and Sexual Harassment Policy or Plan so as to avoid any kind of sexual harassment for the workers. • The Contractor will provide fair working conditions and environment as required by the Employment Act e.g. workers will be allowed to rest, take leave e.g. annual, sick leave, provided with fair pay, contracts etc. The implementing agency will have to approve the Worker's Recruitment Plan including the proposed wages for the workers. • There will be no forced labour at the project site. • There will be no child labour at the project site. All employees will be aged 18 years and above as required by the Children's Act.
Increased business opportunities	Priority to be given to local companies when outsourcing construction materials.
Skills development	Provision of on-job training for the workers (unskilled and semi-skilled) in various areas of construction. This could be achieved through deliberately placing unskilled workers with semi-skilled personnel and semi-skilled with skilled workers.
Negative impacts	
Impact on property	• A detailed Resettlement Action Plan will be prepared and implemented in accordance with national laws and international guidelines and principles. The Plan will clearly set out the land acquisition and resettlement procedure highlighting all available alternatives for compensation. • All persons losing land will be promptly and adequately compensated before construction activities begin • Financial literacy among the Project Affected persons will be instituted to avoid mismanagement of earnings from cash compensation
Temporary loss of access to homes and businesses	• Handle sections of the road to shorten the period of disruption. • Access to existing businesses will be maintained by creating temporary driveways, and/or providing alternate access points. Accesses will be restored after construction.
Loss of business, decrease in customers and income	• Compensate the owners of business premises adequately to enable them replace the buildings before onset of construction activities • Provide ample time e.g. 3-6 months for the business owners, boda-boda and taxi operators to look for

Impact	Proposed mitigation/enhancement measures
	alternative business premises.
Disruption of school activities	• Wherever practical, the contractor will schedule construction near schools on weekends. • Wherever this risk exists, the contractor will screen off schools to avoid accidents. • The contractor will engage school administrators to sensitize pupils/students about the risks associated with the road construction and necessary precautions they need to undertake. • Disseminate information regarding the work plan for construction activities along sections with schools in a timely manner to enable the school administrations make any necessary plans that they may see fit e.g. sensitization of their pupils and students etc. • Project workers especially drivers will continuously be sensitized and reminded to be extra careful especially when working close to schools. • Use of flagmen at the construction site near schools to control traffic and reduce noise levels
Influx of people	• Information dissemination to the interested communities and local leaders along each road about the available jobs. • Recruitment of local people for the less specialized activities, wherever possible. • Put in place an internal control system to curb cases of theft of materials • Collaborate with the local security in the area to ensure safety of project materials • The contractor will have a code of conduct for its workers to minimize some of the risks. • A Grievance Management Plan will be prepared and implemented by the Contractor for use by the concerned parties. Local authorities at Sub County and village levels will be involved in the solving of grievances. As a minimum the Grievance Resolution Mechanism / Plan will consist of a clear point of contact to receive the grievances, responsible persons to solve the different categories of cases and proper and clear channels for feedback. • The contractor will provide adequate sanitation facilities for workers on each road. The project being linear in nature, the distance between these facilities will be short to avoid workers trekking long distances to access them. • A Waste Management Plan will be in place and implemented by the contractor with strict supervision from KCCA.

Impact	Proposed mitigation/enhancement measures
	• The Contractor will have a comprehensive HIV/AIDS Management plan for its workers informed by a baseline so as to reduce the risk of spreading the disease e.g. provision of condoms, free testing and counselling services, HIV/AIDS awareness programs etc. • HIV/AIDS awareness programs on radio or television plus any other methodology to disseminate the information to the community. An independent NGO will be procured by KCCA to carry out the awareness. • Minimize stagnant pools of water as much as possible by ensuring that trenches are not left open for a long time. • Prepare and implement a Stakeholder and Citiizen Engagement Plan to help in the management of community expectations and any other issues that may arise. • The contractor will have a comprehensive social management plan informed by a baseline and stakeholder engagement to manage social vices both for local and international staff • Contractor will ensure that there are toilet facilities on site for both males and females • Contractor will ensure that no children are employed on site.
Impact on Vulnerable groups	• Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly. • The affected vulnerable households will be compensated fairly and adequately. • Livelihood restoration strategies will be extended to the vulnerable groups and their income levels monitored closely during the implementation process. • Equal distribution of jobs to all including vulnerable households. • There will be no forced labour or child labour at the project site. All employees will be aged 18 years and above. Furthermore, employment records will be disaggregated by age and sex.
Impact on gender	• Jobs will be equitably distributed to both women and men as long as one has the qualification rather than basing on gender to allocate jobs. Employment records disaggregated by sex will be kept by contractor and easily accessed by the monitoring and supervising team. • Information dissemination about dangers of HIV/AIDS to the community will be done all throughout the period of the project. The messages will be passed on using the locally understood language for better

Impact	Proposed mitigation/enhancement measures
	understanding and the main means of information access to make them effective. • Workers will be sensitized to desist from any sexual relations with the local people to avoid cases of family break ups. • A Sexual Harassment Policy will be developed by the Contractor before start of the construction and its contents distributed and disseminated to all workers. This plan will include items like; key point of contact e.g. Human Resource Manager, Health and Safety Manager or Community Liaison Office; procedure for reporting, incident referral plan, mitigation measures and penalties to the culprits etc. • Prompt and effective remedial action will be taken after investigating the sexual harassment claims. • Sensitisation of employees and supervisors about sexual harassment will be undertaken at the beginning of the construction so as to avoid any possible sexual harassment. In addition, continuous reminders will be made from time to time. • Display clear and visible posters on reporting channels at the respective construction offices and along the several sections of the roads where construction is taking place.
Disruption of traffic	• A Traffic Management Plan (TMP) will be implemented during project construction. Specific elements of the TMP will include but not limited to the following: the use of flaggers and temporary lane realignments to maintain through traffic, concrete barriers, signage to direct traffic movements, and possible reduction of speed limits in construction zones. It will aslo include a description of measures to be taken to protect pedestrians and community health and safety mitigation measures • Traffic can be accommodated by means of stop/go conditions in partial-width construction wherever possible. • Inform road users about location of road works and advise on use of alternative existing roads • Coordination with traffic police in traffic management • Deployment of flag men to control traffic flow at all project sub component sites
Disruption of public utilities and infrastructure	• The Contractor will need to prepare a utility relocation plan and liaise with the utility providers to carry out temporary or permanent relocation, and to protect the utility infrastructure to ensure minimal damage and disruption of services, Damage to the water sources will be avoided wherever possible. If not possible, plans to provide alternative water sources will be made by the implementing agency.

Impact	Proposed mitigation/enhancement measures
	Consultations with the utility service providers will be commenced right from the design stages to ensure that all the utility services within the alignment are relocated before the commencement of the Works
Impact on Occupational Health and Safety	• An Occupational Health and Safety Management Plan will be put in place by the contractor before commencement of the project and will implement its provisions. The Safety Plan will put into consideration the safety procedure in case of accidental bursts of sewage pipes. Workers will at all times wear PPE. • Contractor to work in close collaboration with NWSC in the event that sewage pipes break or to minimize the possibility as much as possible. • Disseminating of relevant safe working procedures to all workers • Provision of appropriate Personal Protective Equipment to the workers e.g. ear muffs, overalls, nose masks, helmets, safety boots, safety jackets • Labelling of danger zones and hazardous materials • Restrictions/control of access to potential danger zones or usage of hazardous chemicals • An Emergency Response Plan /Contingency Plan taking into consideration all emergencies will be prepared before the commencement of the project. This will be communicated to all workers. • All construction equipment used for the execution of the project works will be fit for purpose and carry valid inspection certificates and insurance requirements. • Risk assessment will be prepared and communicated prior to commencement of work for all types of work activities on site. • Ensure all plant machines and vehicles are regularly inspected, serviced and maintained. All staff assigned to operate project machines and vehicles will be trained and competent for such a job. • First Aid kits with the relevant medicines and equipment e.g. adhesive bandages, antibiotic ointment, cotton wool, pain killers, non-latex gloves, scissors, thermometer, etc. will be made available by the contractor on site. • An accident log swill be put at each construction site to record and monitor any accidents. • Wear visible apparel to reduce on the risk of accidents due to poor visibility.

Impact	Proposed mitigation/enhancement measures
	• Prepare a Site Traffic Management Plan at worker' camps clearly showing visibly marked pedestrian walkways and parking for project vehicles to avoid any traffic accidents at workers' camp. • Inform and apply site procedures to visitors to the site. • Regular vision tests for drivers. Regular impairment testing for drivers (drug, alcohol). • Regular inspection to ensure the implementation of the recommendations / provisions of the Management Plans and assessment of compliance with the requirements. • Regular reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again. • High noise producing machinery will be fitted with silencers • Noise intensive works such as excavation, movement of project vehicles will be scheduled for the least noise-sensitive time of the day (work between 7:00am to 6:00pm) since the noise impact is less felt during day than during the night. • Limit the speed of project vehicles to 30km/hr. to help minimize the increase in noise levels. To ensure adherence to the set speed limit, speed humps will be put in place where necessary along construction routes and penalty systems introduced. • Since the impact of noise increases with increase in exposure time, the work schedules for workers will also be designed to limit the exposure time. No worker will be exposed to noise level greater than 85dB (A) for a duration exceeding 8 hours per day as stated in the National Environment (Noise Standards and Control) Regulations, 2003. • Conduct Environmental Impact Assessments for material extraction activities
Impact on Community Health and Safety	• Use of road signs & barriers to show the dangerous areas • Enforce restrictions on unnecessary entry into any protected zones • Follow the mitigation measures prescribed to reduce any dust or noise impacts e.g. regular sprinkling of water along the roads like twice a day etc.). • The Contractor will have an HIV/AIDS Prevention Plan for his workers and also implement it so as to

Impact	Proposed mitigation/enhancement measures
	reduce the risk of spreading the disease. • Make provisions for pedestrian and non-vehicular traffic during construction periods. • Use of flagmen to direct the traffic to avoid any accidents. • Constant sensitisations and reminders to workers and drivers about community health and safety e.g. traffic rules etc. • Work in close collaborations with Traffic Police to enforce traffic rules and regulations along the roads under construction. • All project vehicles and trucks will comply with the proposed speed limits i.e. 30-50 based on the road. • The contractor to ensure that all project trucks and vehicles are operated by licensed operators. • The Contractor to be extremely careful when relocating sewage pipes to avoid any accidental sewage bursts and their impacts to communities. • The Contractor will work closely with NWSC so as to ensure that risks associated with breaking of sewage pipes are minimised. • Enhance community liaison for timely gathering of all the related community health and safety issues arising from project implementation • High noise producing machinery will be fitted with silencers • Noise intensive works such as excavation, movement of project vehicles will be scheduled for the least noise-sensitive time of the day (work between 7:00am to 6:00pm) since the noise impact is less felt during day than during the night. Conduct Environmental Impact Assessments for material extraction activities
Biophysical impacts	
Positive impacts	
-	
Negative impacts	
Loss of plant species and degradation of habitats	• Before vegetation clearance, the corridors to be cleared will be clearly marked out to avoid unnecessary vegetation clearance. In addition, clearing will be done manually where possible and will not be done indiscriminately. Trees that have to be felled will therefore be marked before clearance commences.

Impact	Proposed mitigation/enhancement measures
	• Species of conservation concern will be avoided by designing new road lanes on road sides without the species. However, if they cannot be avoided then permission to clear those listed by NFA will be sought from responsible authorities as stated in the law. Also if cleared, the tress will be replanted by the road or junction sides and their regrowth monitored and enhanced until they are mature. • A deliberate campaign will be made beforehand to sensitize all the construction and other workers on the project about the need to minimize damage on plant species. This awareness raising drive will be carried out prior to any operations in the project area. • New road lanes will be placed on the side of the roads that have no wetland/stream or on wetland sides that are more degraded with human activity such growing of crops, trees, and waste disposal • All persons losing crops and trees will be adequately compensated. • Tree clearance will be compensated by tree planting where space provides an opportunity. • In addition, to avoid the impact from becoming significant beyond boundaries of roads mentioned above, the following will be implemented; ✓ Spilling of bitumen that would damage vegetation will be avoided; ✓ Creation of new diversion roads will be avoided by using existing roads as diversions where possible; ✓ Stone crushing plants will be fitted with dust control devices and operated in accordance with manufacturer's specifications; ✓ Workshops, equipment storage facilities and workers camps, will not be put in areas of special conservation value such as forest reserves and wetlands; ✓ Areas which will minimize vegetation loss will be selected for access routes, construction workshops, equipment and materials' storage sites and workers' camps; ✓ Stockpiles of earth will not be placed where there is vegetation, particularly on young plants which have been planted deliberately. ✓ All areas cleared of grass will be revegetated just after decommissioning.
Proliferation of invasive species of plants	• Construction equipment brought in from outside the project area will be cleaned to minimize the risk of introducing invasive species from outside the project area.

Impact	Proposed mitigation/enhancement measures
	• All equipment will be cleaned thoroughly before demobilization out of the project area. • Awareness of the workers and neighbouring communities about the dangers and threats invasive species can potentially pose to ecosystem stability will be enhanced. • Any non-paved disturbed areas will be restored immediately after the operations. This should allow natural regeneration to take place so that the disturbed areas may be re-vegetated with natural vegetation immediately after the construction activities • Growth of invasive species of plants within the proximity to the roads will be monitored and any that may grow in the area mechanically removed, preferably before they begin flowering/fruiting stage • During channelization, the flow direction of water within wetlands will as much as possible be maintained • Borrow material from quarry or borrow pits will be obtained from within the project area as much as possible. • Earth for filling during road construction will be obtained from bare/almost bare ground to minimise on the seed banks that would be carried along with it. • Immediately after construction, road edges cleared of vegetation will be planted with plant species indigenous to those areas and their regrowth monitored until they are mature
Reduction in number of fauna species	• Cutting down of big trees and draining of wetlands which are main habitats for biodiversity will be minimised. Sentitive areas like woodlots and wetlands and major thickets will be avoided during construction. • In cases where the sensitive habitats cannot be avoided, a plan to create these habitats will be put in place. For example, if for unavoidable reasons, one tree is cut down, three more trees at the road side to replace the destroyed habitat will be planted. And if a wetland is to be drained, a section of it to service the remaining ecosystem will be left. • Recovery of such areas (woodlots and wetlands) if affected during construction will be monitored. • Any roosting or breeding sites encountered during construction will be avoided.
Change in geological substructure	• The above mentioned activities that would result into a change in the geological structure will be limited to only the areas under operation.

Impact	Proposed mitigation/enhancement measures
	• Cuts will not exceed the angle of repose which could lead to rock falls, slips and land slides • Stock piles for each type of material excavated will be separated. This will be done to ensure systematic backfilling of created pits and to maintain a geologic arrangement close to the original. • Exposed slopes will be protected using conventional civil engineering structures (such as stone filled meshed fences) in conjunction with bio-engineering techniques • Newly eroded channels will be backfilled and restored to natural contours • Areas susceptible to erosion will be protected using ether temporary or permanent drainage works • Scouring of slopes will be prevented • Ponding will be prevented • If not to continue in use, all borrow pits and quarry sites will be backfilled to as near as possible their original topography • Grouting will be undertaken since it can improve the stability of unstable slopes
Soil erosion and sedimentation (Siltation)	• Minimisation of earth works such as excavation, cut and fill, vegetation clearance, and compaction, to only the area that is absolutely necessary • Construction cutoff ditches around stockpiles to prevent materials being washed away by surface runoff • Excavated and stockpiled materials will be covered with fabric or other materials • Stock piling near waterways or on slopes will be avoided • Use of existing roads as access roads to quarry sites, borrow areas, worker's camps, and workshops where possible • Revegetation of any constructed access roads during the decommissioning phase of the project. • Location of stone crushing plants away from water courses • Stone crushing plants will be fitted with approved dust controls and operated in accordance with manufacturer's specifications • Soil erosion checks will be put in place whereever necessary along drains. These checks will include scour checks, silt traps, paving of drains, and stone pitching. In addition, drains will be regularly desilted.

Impact	Proposed mitigation/enhancement measures
	• Construction of interception ditches, and settling ponds to prevent muddy water reaching water sources • Water supply sources will be identified and relocated before site clearing and construction. • Excavation and grading activities will be planned during the dry season where possible • After construction, vegetation will be planted in areas where vegetation was removed including areas where soil spoil was previously dumped. • Channelisation will be done in such a way that water continues to flow in a direction as near as possible to its original. • Rock boulders will be placed as the first layer at the bed of swamps when filling swamps to allow continued water flow. • Undertaking works in sloppy areas (catchment areas) will be avoided. However if they must be undertaken there then drainage systems (outfall drains) will be installed to make sure water from the catchment areas maintains its original flow direction/to make sure that water from catchment areas ends up in its usual basins. • Where banks of streams going through the wetlands are erodible, gabions and other measures to minimize erosion will be put in place • Culverts and drainage channels will be constructed/installed taking the peak water levels of streams and swamps into consideration. • Culverts will be leveled appropriately so that they are self-cleaning. • De-silting of road drainage systems will be undertaken regularly. • In addition, individual Environmental Impact Assessments (EIAs) for excavation of material from borrow pits, quarry sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants will be conducted before the excavation of material from borrow pits, quarry sites and before the construction of workshops, workers' camps, equipment storage sites etc. The EIAs will however be spearheaded by qualified and registered EIA practitioners.
Air pollution	• To minimize dust emissions caused by movement of vehicles, unpaved roads will be sprinkled with water

Impact	Proposed mitigation/enhancement measures
	(using water browsers); • Personal protective equipment such as dust masks will be availed to workers whenever needed; • Regular servicing of vehicles and machinery that are likely to produce excessive gaseous emissions will be undertaken • The speed of haulage trucks and other vehicles will be limited to 30km/hr. to reduce dust emission. To ensure this, speed humps will be put in place, sensitization of drivers about speed limits undertaken and penalties for drivers that do not heed to the speed limits enforced. • All idle equipment or machinery will be turned off to minimize on gaseous emission.
Post-construction phase	
Socio-economic impacts	
Positive impacts	
Improved mobility of vehicles, reduction in travel time and reduced traffic congestion	• Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with. • Installation of road signage to control against accidents related to the "new road effect"
Reduced vehicle wear and tear thus reduced maintenance costs	• Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with. • Regular post construction road maintenance to avoid the breakdown of the new road infrastructure and return to the initial poor road conditions
Reduction in dust levels	• Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with. • All bare surfaces opened during the construction phase will be rehabilitated by way of revegetation • Routine (preferably daily) sweeping of the roads and their sides to reduce on any dust that may accumulate as a result of day to activities of people operating along the different roads. • Enforce speed limits

Impact	Proposed mitigation/enhancement measures
Improved access to health services	• Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with. • Availability of drugs in health facilities • Adequate medical personnel to help save the lives of people.
Increase in value of land and property along the roads	• Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with. • Availability of drugs in health facilities • Adequate medical personnel to help save the lives of people.
Land development and more business opportunities	None
Improved sanitation and a reduction in related diseases	• KCCA will provide dumping bins in designated places for people to dump in their rubbish. These bins will be emptied on a regular basis. • Private garbage collectors will be contracted to collect rubbish along the roads on a regular basis. • Sensitisation campaigns towards change in sanitation practices and proper sanitation could be engineered by KCCA in Kampala in general and along the roads. • Bylaws against littering of rubbish will be developed and disseminated to the people. Fines will be paid by whoever breaks them.
Street lighting	• Continuous community awareness on community policing to safeguard the street lights. • The lights will be designed in a way that they will be difficult to be stolen/vandalised
Improved Scenic Beauty/Aesthetics	• Daily sweeping of the roads is required • Routine and timely garbage collection by KCCA • Enforce fines to whoever will be found littering garbage anyhow. • Periodic and regulated desilting of drainage channels • Periodic maintenance of the roads and street and junction lights
Tourism attraction	• Increase/ promote of archaeo- tourism related activities

Impact	Proposed mitigation/enhancement measures
	• Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.
Negative impacts	
Loss of jobs	• Counselling programs for the workers before completion of the construction. • Financial literacy and management trainings may be carried out for the workers to ensure proper and prudent use and investment of their salaries to ensure continued earning even after completion of construction.
Blocking of access to homes and other public places	• Ensure that after construction, there are alternative accesses to the blocked homes • Round culverts will be adopted for drainage in the sections where there is a home or business premise in close proximity to the road.
Increase in traffic on some roads	Proper signalization of the proposed junctions like Kabuusu junction and effective use of the traffic lights will help to reduce the anticipated traffic along the affected roads.
Risk of accidents due to over speeding	• Proposed speed limits per road will be maintained. • Wherever feasible, humps will be installed to regulate speed. • Road safety campaigns especially among pupils/students will be undertaken by the schools' administrations. Introduction of road safety education curriculum in schools especially primary and secondary levels. • Where feasible especially near schools, zebra crossings will be provided for. • Road safety campaigns in general for road users through radio talk shows. • Placement of traffic officers along areas that may considered most at risk e.g. at junctions. • Constant performance monitoring of the roads to identify any black spots that could lead to accidents.
Biophysical impacts	
Positive impacts	
-	
Negative impacts	
-	

Impact	Proposed mitigation/enhancement measures
Cumulative impacts	
Increased disruption of traffic	The mitigation measures for the independent project impact presented in the report will be implemented.
Increased loss of plant species and degradation of habitats	The mitigation measures for the independent project impact presented in the report will be implemented.
Increased air pollution	The mitigation measures for the independent project impact presented in the report will be implemented.

Residual impacts

Upon successful implementation of the impact mitigation measures the significance level of the negative impacts will be reduced to either minimal/no or small negative.

Impact monitoring

An environmental and social management plan (Table 55) to ensure implementation and check on the efficiency of the proposed mitigation measures has been developed. In the plan, monitoring roles are assigned to the Developer and/or his contractors and consultants, NEMA, Local leaders, Police, Utility service providers, Ministry of Works and Transport, Ministry of Gender, Labour and Social Development, Ministry of Lands, Housing and Urban Development, Petroleum Supply Department and Ministry of Tourism and Antiquities(Department of Museums and Monuments. The total cost for monitoring during the construction phase and liability period has been estimated at **USD 362,754.** The stated cost excludes contractor monitoring costs.

Conclusion

The project will result into a number of impacts on the environment. These impacts will be both positive and negative. Measures to mitigate each of the identified the negative impacts have been recommended. Once these measures are implemented, then the impacts will be minimized.

Recommendations

The developer is called upon to ensure that the mitigation measures proposed under this report are implemented.

The developer should also ensure that the ESMP presented under this report is available to the relevant parties responsible for implementing it.

To supplement the ESMP presented under this report, all contractors should be called upon to develop the following Environmental management plans;

- A Spill Prevention and Counter Measure plan
- Waste Management Plan
- Occupational Health and Safety Plan
- HIV/AIDS Prevention Plan
- Erosion and Sediment Control Plan
- Flood Control plan
- Environmental Management Plan
- Environmental Restoration plan
- Traffic management plan

- Utility relocation plan
- Stakeholder and Citizen Engagement (Grievance Management) Plan

The developer should ensure that on completion of project works, all sites disturbed by the project works are restored to as near as possible their original state before the commencement of the project works as per developed and approved restoration plans.

Since impacts are site specific, individual Environmental Impact Assessments (EIAs) for excavation of material from borrow pits, quarry sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants and any other ancillary works e.g. creation of road diversions, extraction of water from water sources etc. should be conducted by the developer/contractors, before the commencement of works. The EIAs should be spearheaded by qualified and registered EIA practitioners.

The contractor should recruit an Environmentalist, a Community Liaison Officer, Health and Safety Officer, among other staff, who will monitor the implementation of the ESMMP.

The contractor's environmentalist should produce and submit to the developer/Supervising consultant's Environmentalist monthly reports on how far the project conforms to the statements in the ESIA report.

The developer should keep records and make monthly and annual reports to NEMA describing how far the project conforms to the statements in the ESIA report.

As required by the National Environment Audit Guidelines, the developer should carry out environmental audits of the project and submit the first Environmental audit report to the Executive Director, NEMA within a period of not less twelve months and not more than thirty six months after the commencement of the project. Also, environmental audits should be conducted by the developer or the contractors for the project ancillary components including borrow pits, quarry sites, workshops, workers' camps, equipment storage sites, road diversions etc. for which individual EIAs will have been carried out. The audits or the ancillary facilities should be conducted between the first year and the third year after the commencement of the project ancillary operations or after the completion of the ancillary operations or earlier if the operations will run for less than a year)

The developer should obtain any necessary permits including water abstraction permits, waste discharge permits, fuel transportation and storage permits, permits to cut down reserved species among others.

The developer or contractors should ensure that impacts not contemplated at this stage are quickly addressed in case they arise.

If the developer wishes to add any other component onto the project which was not considered under this assessment, a fresh Environmental and/or Social Impact Assessment (as an addendum) for the additional component should be undertaken to determine its compatibility with the immediate environment, its impacts on the environment and to identify appropriate mitigation measures for its adverse impacts.

1. CHAPTER ONE: INTRODUCTION

1.1 Background

Traffic congestion in Kampala city is fast growing due to a combination of poor roads network, uncontrolled junctions, and insufficient roads capacity which is out of phase with the increasing traffic (vehicular and pedestrian) on Kampala roads. This congestion results into higher vehicle operating costs, long travel times and poor transport services. The overall city aesthetics and quality of life is highly compromised by the dilapidated paved roads and sidewalks, unpaved shoulders and unpaved roads which are sources of mud and dust that hovers over large sections of the City.

The Government of Uganda through Kampala Capital City Authority (KCCA) with support from the World Bank intends to improve mobility in Kampala City through improvement of selected road links and Junctions/intersections. The selected junctions/intersections are to be signalized while the selected roads are to be dualled or reconstructed or upgraded to paved standard.

An Environmental and Social Impact Assessment (ESIA) is being conducted for the proposed project as part of the consultancy services for the preliminary and detailed engineering design of selected road links and junctions/intersections to improve mobility in Kampala City under the Second Kampala Institutional and Infrastructure Development Project (KIIDP 2). SMEC International Pty Ltd in association with Newplan Limited has been contracted by KCCA to carry out the consultancy services. This report presents the findings of the ESIA.

1.2 Purpose of the Environmental and Social Impact Assessment (ESIA)

The proposed project is proposed to be undertaken within a heavily urbanized environment characterized by built up areas and a few natural areas that could be affected with implementation of the project. The purpose of the ESIA study was therefore to ensure that if the project is undertaken, it is undertaken in such a way that there is little or no adverse impact on the physical, biological, cultural and socio-economic attributes of the environment of the proposed project area.

The National Environmental Act, CAP153 requires that an EIA is undertaken for all projects that listed under the third schedule of the Act with a view of sustainable development. The proposed project is one of the projects listed under Section 3 (Transportation) of the Schedule, hence the ESIA was undertaken to fulfill legal requirements besides protecting the environment.

1.3 Objectives of the ESIA

1.3.1 General Objective

The general objective of the ESIA was to identify and assess the potential environmental and social impacts of the proposed project with a view of eliminating/minimizing the negative impacts.

1.3.2 Specific Objectives

The specific objectives of the project are as stated below;

1. To examine the existing environmental and social baseline conditions of the proposed project area.
2. To obtain stakeholders views on the proposed project
3. To identify the potential significant environmental and social impacts of the proposed project.
4. To determine and analyze the level of significance of the potential significant environmental and social impacts of the proposed project.
5. To recommend measures that can be taken to avoid, offset or reduce the potential adverse environmental and social impacts of the proposed project.
6. To recommend measures that can be undertaken to enhance the positive potential environmental and social impacts of the proposed project
7. To describe and analyze any project alternatives that were being considered.
8. To determine if the proposed project conforms to existing policies, plans, laws and regulations
9. To recommend whether or not the proposed project should be implemented

1.4 ESIA process

The ESIA followed the EIA process as presented in the Guidelines for Environmental Impact Assessment in Uganda. Reference was also made to the EIA process for road projects in Uganda presented in Figure 1 below.

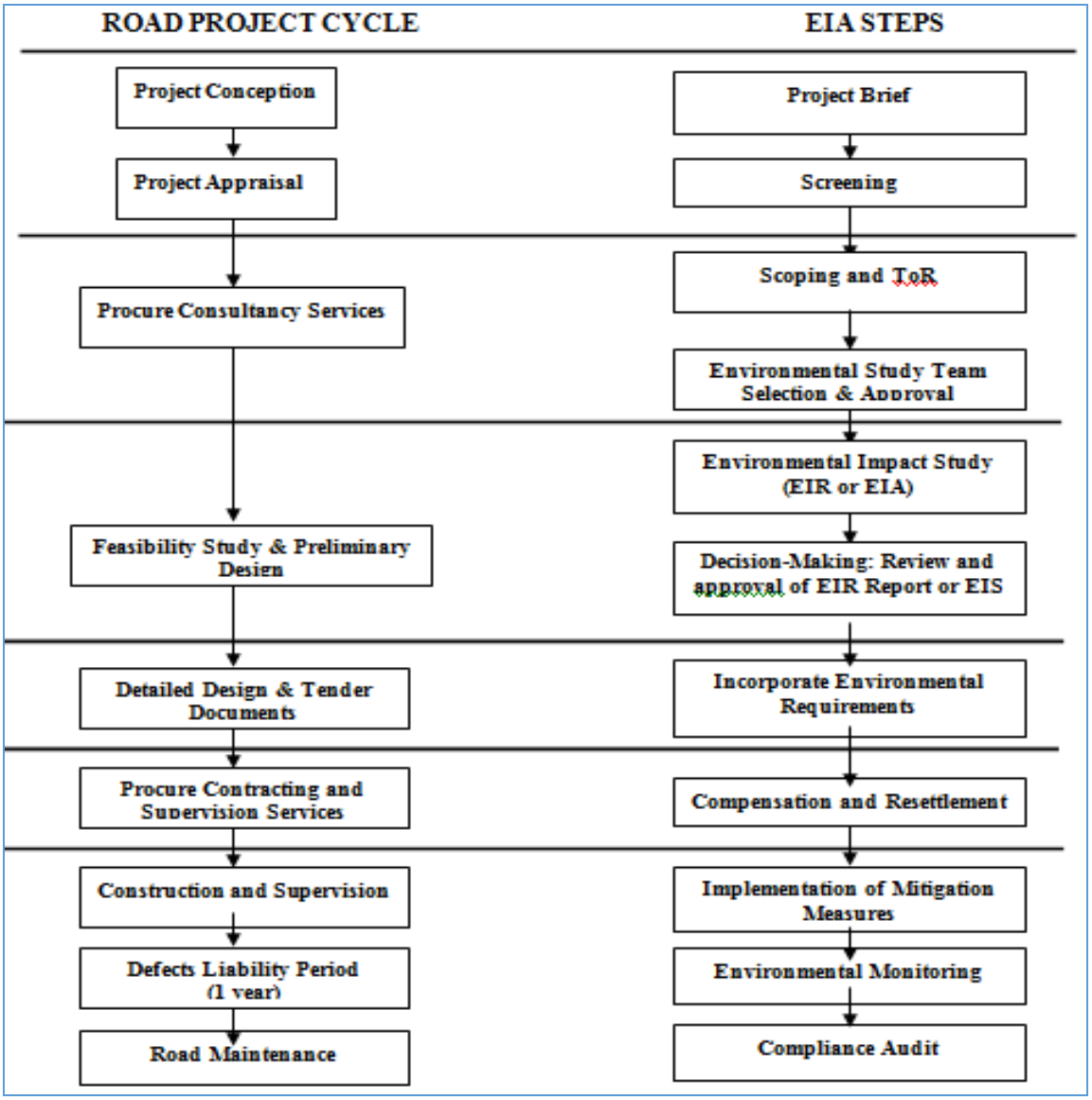


Figure 1: The ESIA process for the road projects in Uganda

Source: Draft EIA Guidelines for road projects in Uganda (MWHC, 2004)

As such the ESIA study commenced with a scoping exercise involving field visits and stakeholder consultations and literature review to determine the scope of work. The scoping exercise informed the formulation of the Terms of Reference for the ESIA of the proposed project that were submitted to National Environment Management Authority (NEMA) for review and were approved by the same authority. The approved Terms of Reference together with the approval from NEMA that have directed the ESIA are appended to this report under Appendix I and II respectively.

1.5 ESIA Methodology

1.5.1 Literature review

Existing online and in-house literature related to the project and project area including District Development Plans, District State of Environment Reports, and Environmental Impact Statements for previous road projects among others was reviewed. Available documentation on the proposed project from the design engineers was also reviewed. The Guidelines for Environment Impact Assessment in Uganda as well as other existing national and international (World Bank) policies, guidelines, standards, and legislation were also referred to. A full list of all literature referred to is given under the bibliography section of the report.

1.5.2 Stakeholder Consultations

Stakeholder consultations were carried out at the scoping stage and continued through the ESIA phase to ensure that the knowledge, experience and views of stakeholders and the general public are taken into account at all stages of development of the project. This is in line with the statutory consultation requirements under the Environmental Impact Assessment Regulations and World Bank environmental and social safeguard policies. Consultations were done at national, district and local level. Community sensitizations and consultations will be an on-going activity throughout all the phases of the project.

1.5.3 Field Baseline surveys

Inorder to assess the level of significance of the impacts of the proposed project, biophysical and socio-economic and cultural baseline field surveys were undertaken between April 2015 and December 2015. The methods employed for each survey are presented under this section.

1.5.3.1 Socio-economic Survey

The socio-economic survey involved identification of socioeconomic baseline conditions within the project area (both general and site specific). Identification of socioeconomic baseline conditions helps to identify and analyse impacts from the project, propose mitigation or enhancement measures and to form a basis for future monitoring of project impacts on the human environment.

The socio-cultural environment was determined based on secondary data, consultations, observations and a socioeconomic household survey of households along the different road links. A total of 2,504 questionnaires were administered for randomly selected households along the different roads. The number of questionnaires for each road link was mainly determined based on the settlements along the road and availability and willingness of respondents to respond to the questions. Being an urban project, some challenges were faced especially in areas where the settlements are mainly fenced off and where some respondents were more concerned about their

businesses than anything else. Table 1 shows the distribution of respondents per road/cluster of roads (refer to Appendix XI for roads and junctions in each cluster).

Table 1: Distribution of respondents

Name of cluster / road	No. of Households interviewed
Cluster 1	393
Cluster 2	373
Cluster 3	186
Cluster 4	154
Cluster 5	120
Cluster 6	21
Cluster 7	82
Cluster 8	98
Cluster 9	612
Sir Apollo Road	65
Namungoona road	110
Buwambo-Kiteezi road	69
Kyebando road	73
Luwafu road	22
Kisaasi 2 road	126
Total	**2,504**

A total of 1,126 businesses, 78 education institutions, 72 health facilities and 26 NGOs operating in the area were also included in the study. Schools and health facilities included in the study were mainly privately owned.

Interviewer administered questionnaires in Appendix III were used for the socioeconomic household survey. The data was collected by trained Research Assistants. Quantitative data from the questionnaires was analyzed using the Statistical Package for Social Scientists (SPSS) while qualitative data was analyzed using thematic procedure and content analysis. The themes were analyzed and interpreted according to survey variables. Content analysis was used to analyze data that was not frequently reported but had profound implications for the survey variables.

1.5.3.2 Flora survey

1.5.3.2.1 Literature review

A review of online and in-house literature including vegetation survey methodologies, District State of Environment reports, and IUCN Red list, among others was undertaken to prepare for the field survey and to build on and analyse data collected from the field. The full list of literature reviewed is provided under the Bibliography Section.

1.5.3.2.2 Field survey

A field survey was undertaken in September 2015. The objective was to identify in detail the existing vegetation and plant species composition by the selected road corridors and junctions.

For roads less than 5 km, the survey involved trekking 1 km transects along the roads and recording of any plant species seen within 30m from the centre line of the road. For roads greater than 5km, a similar method was employed but more than 1 transect was trekked at intervals of 3km.

Plot less site observations were made at identified ecologically sensitive habitats such as wetlands and streams by the roads even when located outside the study transects.

The field survey at every junction involved recording of all species within a radius of 50m from the Centre point of the junction.

A Hand-held Global Positioning System receiver was used to mark the survey points and all other points of interest.

The plants that could not readily be identified in the field were collected for subsequent identification at the Makerere University Herbarium (MHU). The classification of each plant was done at family, Genus and species levels as far as possible. The life form of each plant was recorded as Tree, Shrub, liana or herb.

1.5.3.3 Fauna survey

Transects each 1km long were randomly set up along each of the study roads. These were transects used to survey both birds and large mammals in the study area. The habitats along these transects were described in simple terms to give the general picture of the habitat along the respective roads. GPS reference points and photos were taken for each transect surveyed.

1.5.3.3.1 Birds

Birds were surveyed along the project roads and junctions with the aim of recording all species that utilize the area as habitat and then identifying those of conservation concern. Birds in the sites were surveyed using the sectioned transect method (Nature Uganda 2012). This method involves counting birds by moving along a transect which was 1km long and 1km wide, divided into ten equal sections. The standard transect is normally 2km to capture the different habitats in the survey area. However, given that this was an urbanized, more-less open area with a homogenous nature of the habitat, and the small size of the sites, 1km transects were used but the concept remains the same. During the counts, all birds seen and heard with in a distance of 500m on both sides of the road were counted. The junctions were surveyed by using point counts (Bibby *et al.* 2000). This involved standing at one point and recording all birds seen or heard in a radius of 100m from the centre of the junction for a period of 10 minutes.

Birds in the field were identified using 8 X 42 Binoculars as guided by the standard field guide to Birds of East Africa by (Stevenson & Fanshawe 2002) and The Uganda Bird Atlas by Carswell *et al.* (2005). Bird species habitat classifications were guided by Bennun *et al* (1996). In this classification, we have;

- FF forest specialists – these are true forest species most characteristic of the interior of undisturbed forest. Breeding also happens in the forest.
- F Forest generalists – typical birds of forest edges and gaps.
- f species – forest visitors and breeding is outside the forest.
- G species – grassland species
- W Water birds normally found near water, in wetlands or open water.

Bird species with migratory tendency were also considered as derived from the Uganda Bird atlas (Carswell *et al.* 2005). There were two categories of migrant species considered; A or AM-Afro-tropical migrants and the P or PM- Palearctic migrants.
However some species can be both Afro-tropical and Pale-arctic migrants.
Birds were further classified according to their conservation status i.e. whether they are species of conservation concern (C) as according to the IUCN red data list version 2015, Collar & Stuart 1985, Bennun & Njoroge 1996, described as species of Global (G-) or Regional (R-) importance in the categories of;

- CR Critical (Globally (G-CR) or Regionally (R-CR))
- EN Endangered
- VU Vulnerable
- NT Near-threatened
- RR Regional Responsibility

1.5.3.3.2 Mammals

Only large Mammals were considered in this survey. Because the area is highly settled and modified by human activities, no significant populations of wild animals can be expected to survive in the area. There are no natural habitats to act as ranging areas for medium or large mammals. Mammals were surveyed by observation to record any species seen along transects. Community members at the sites were interviewed about the wild animals seen in their area especially in places with likely habitat to establish if any mammals still occur in the place. Opportunistic observations were also targeted to record mammals seen anywhere in the study area. The Conservation status of the mammals was also considered as according to the IUCN red data list version 2015.

1.5.3.4 Noise and air quality survey

As part of the Environmental and Social Impact study for the proposed project, noise and air quality assessment were undertaken. Noise and ambient air quality measurements were limited to sensitive receptors near the roads and junctions that were proposed for improvement. Such receptors included trading Centers, residential areas, churches, Banks, medical centers and schools among others. All points were the measurements were done were geo-referenced and the coordinates are provided in Appendix IV. The objective was to compare the existing conditions in the project areas and use them to predict the impacts that may arise from construction activities and the operation phase of the proposed development. Noise measurements were undertaken using the AWA5661 sound level meter at at various points in the project areas. Air quality measurements were conducted using CEM DT-9881M particulate meter at various points within the project areas. The CEM DT-9881M particulate meter was used to measure particles of 2.5μm and 10μm as well as, Relative Humidity (RH) and the atmospheric temperature (AT). The results of the noise and air quality survey are presented in Appendix IV.

1.5.3.5 Hydrology survey

Hydrological information mainly obtained thruogh literature review and visual assessment. Literature reffered to is provided under the Bibliography section of the report.

Visual assessment of the drainage structures was conducted on all the roads from during the initial project investigation phase. The data collected included the following:

- Hydraulic performance
- Physical condition
- Possible causes of damages
- Material used for construction and their performance
- Possibility of maintenance or repair
- Performance with respect to traffic safety
- Need for replacement

The data was collected manually by walking along the roads and examining the various drainage structures. The geographical location of each structures was noted by capturing their coordinates using a hand held GPS. Photographs showing the visual conditions of the structures were also taken using a digital camera.

1.5.3.6 Water quality survey

Road construction activities are a major source of pollutants to natural water bodies such as rivers, streams and wetlands (Brinkmann et al 1985). The sources of water pollutants at construction sites include soil erosion, diesel and oil, other harmful chemicals, construction debris and dirt. Pollutants generated from these sources are transported to adjacent water sources through both direct discharge by workers at the site as well as indirect discharge with storm water runoff leading to physical, chemical and biological degradation of water quality (Michael et al, 1995). The project activities for the proposed reconstruction and upgrading of the roads and junctions will have a direct impact on the water quality of the water sources nearby. Therefore as part of the environment impact assessment, a water quality baseline study was undertaken. The information collected from this study will provide benchmark data prior to any impact of the proposed project activities on water quality and provide a reference point for comparison with subsequent water quality assessments. The objective of the water quality baseline study was to assess the biological, physical and chemical condition and quality of the water resources within the project area.

1.5.3.6.1 Sampling

Water samples were collected from 15 locations along the affected roads/junctions within the project area shown in Table 2 below. Focus was given to the water sources that are used by the communities for domestic purposes such as drinking. The water quality samples were collected in 1.5 liter plastic sampling bottles except for samples to be analyzed for fecal coliform which were collected in sterile glass bottles provided by the Laboratory. The samples were analyzed within the stipulated holding time limits.

Table 2: Water sources sampled and their locations on the affected roads

GROUP 1 PROJECTS			
2B-DUALLING			
No.	Road/Junction	Water source type	Coordinates (UTM/Arc1960)
2B.3	Port bell road	Lake	36N 0461447 0032402
		Stream	36N 0461407 0032595
		Wetland	36N 0460980 0032955
2B.4	Spring road	Water channel	36N 0456499 0035880
2C-ROAD RECONSTRUCTION UPGRADING			
2C.3	Sentema	Spring	36N 0448415 0036430
GROUP 2 PROJECTS			
2B-DUALLING			
No.	Road/Junction	Water source	coordinates
2B.5	Ntinda/Nakawa	Stream	36N 0457199 0038161
2C-ROAD RECONSTRUCTION			
No.	Road/Junction	Water source	coordinates
2C.3	Ssuna	Water channel	36N 0450695 0029946
2C.6	Muzito	Water channel	36N 0450803 0030470
2C.18	A109	Water channel	36N 0447508 0033593
RU-ROAD UPGRADING			
No.	Road/Junction	Water source	coordinates
RU.7	Kirombe	Water channel	36N 0455018 0032210
RU.9	Wamala	Spring	36N 0448989 0037479
RU.5	Mugema	Wetland	36N 0447938 0035674
RU.10	Old Mubende	Spring	36N 0446127 0034788

RU.12	Tuba	Stream	36N 0456880 0042956
RU.13	Kulambiro/Najeera	Stream	36N 0457485 0042173

1.5.3.6.2 Water Quality Analysis

Samples were analyzed at the National Water Quality Laboratory (NWQL) for the set of parameter listed in Table 3 below. These parameters were identified from literature review on water quality monitoring activities for road construction projects, recommendations and visual inspection. Parameters such as oil and grease and heavy metals (Lead) were not analyzed because National Water Quality Laboratory doesn't analyze them. The analysis of the physio-chemical parameters were carried out following the standard method of analysis.

The Biological Oxygen Demand (B.O.D) test is based mainly on bio-assay procedure measuring amount of oxygen consumed by bacteria. Because of the low solubility of oxygen in water, the sample was diluted proportionately depending upon the expected B.O.D so that the demand does not exceed the available oxygen. The test was carried out for 5 days. The Chemical Oxygen Demand (C.O.D) determines the amount of oxygen required for oxidation of organic matter using a strong chemical oxidant such as potassium dichromate under reflux conditions.

The Electrical Conductivity (EC) was measured with the help of an electrical conductivity meter. The pH was determined by a pH meter. Turbidity is a measure of the amount of light that is scattered and absorbed in a sample. Turbidity was measured using a Nephelometer. Membrane Filter technique was used for determining fecal coliform concentration in the samples. Titration method was used to determine bi carbonate presence in the samples. Orthophosphate was determined by using Ascorbic Acid method. Nitrate in the samples was determined using cadmium reduction.

To measure Total Suspended Solids (TSS), the water sample is filtered through a pre-weighed filter. The residue retained on the filter is dried in an oven at 103 to 105° C until the weight of the filter no longer changes. The increase in weight of the filter represents the total suspended solids. To measure Total Dissolved Solids (TDS), the water sample is filtered, and then the filtrate (the water that passes through the filter) is evaporated in a pre-weighed dish and dried in an oven at 180° C, until the weight of the dish no longer changes. The increase in weight of the dish represents the total dissolved solids.

Table 3: Selected Parameters for water quality baseline conditions

	Parameter	Units
1	Fecal coliform	CFU/100mL
2	B.O.D	mg/L
3	C.O.D	mg/L
4	Bi carbonate	mg/L
5	Electrical conductivity (EC)	µS/cm
6	Iron: Total	mg/L
7	Nitrate-N	mg/L
8	Ortho-phosphate: Reactive	mg/L
9	pH (physical-chemical)	mg/L
10	Total Dissolved Solids (TDS)	mg/L
11	Total Suspended Solids (TSS)	mg/L
12	Turbidity	NTU

The results of the water quality analyses are presented in Table 13 and Appendix V.

1.5.3.7 Physical cultural Resources Survey

The phyisical cultural resource assesment involved gathering of the existing baseline data, interviews, group discusion, site visit and walkover on roads and junctions. The use of these techniques aimed at identifying and assessing whether the project will have significant impacts to the archaeological and cultural heritage resources. It was also aimed to develop mitigation measures during the course of the project (contruction and operation).

1. Desk study: A desk study was undertaken to compile a comprehensive inventory of recorded sites of cultural heritage within the project area. Various reports from National Environmental Management Authority, Uganda National Museums were consulted. These include published documents such as papers and books and unpolished ones such as reports including maps and related historical documents.
2. Ethnographic Inquires: This was done by consulting stakeholders on heritage resources at Kasubi Tombs and Uganda National Museums. In additional local people were interviewed from various locations of the proposed project area. The interviews used unstructured questions mainly aim to identify the resources and asses their level of significance.
3. Archaeological surveys: To supplement the information gathered in desk top study, archaeological survey was done with the view to identify cultural heritage resource found at the project area, assess their cultural significance together with their state of preservation. Surveys took place along all roads, junctions and near vicinities of the project area.

Soils and geology survey

Materials investigation along the existing road link alignments comprised trial pitting and sampling of subgrade soil and pavement layers, DCP tests and laboratory testing.

Trial pits

Trial pits were excavated along the approximately 110km of total roadway, generally at an interval of 500m to a depth of about 1m. The vertical profile of the pavement from each trial pit was GPS coordinated and recorded as trial pit logs and photos. Representative samples of the subgrade materials were sent to the laboratory for testing.

Laboratory testing

Samples of materials collected from all the existing road ways were tested at GETLAB laboratory for quality in accordance with standard specifications prescribed here under in Table 4 below.

Table 4: Laboratory test conducted on subgrade soil and gravel samples

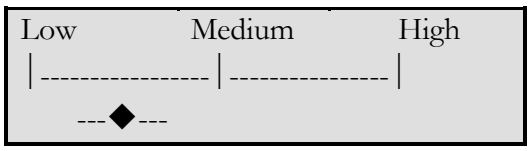
No.	Test Description	Reference Standard Code
1	Insitu moisture content	BS1377: Part 2, Clause 3: 1990
2	Particle size distribution	BS 1377: Part 2, Sub cl. 9.2: 1990
3	Liquid limits	BS1377:Part 2, Clause 4: 1990
4	Plastic Limit & Plasticity Index	BS1377:Part 2, Clause 5: 1990
5	Linear Shrinkage	BS1377:Part 2, Clause 6: 1990
6	CBR(3 point 4 days soaked)	BS 1377- 4 (1990)
7	Compaction (BS Heavy)	BS1377:Part 4, Clause 3: 1990

1.5.4 Impact Significance Assessment

To establish impact significance, the impact assessment/analysis methodology summarised in Figure 2 below was used with a standardized three-step approach:

Step 1:

Baseline environmental and social conditions were firstly described in detail and valued on a continuous scale from 'low value' to 'high value' as illustrated below.



The value scale was assigned to the impact zones and the characteristics thereof. This value was related to international, national or local guidelines, standards and evaluations. Values were assigned to elements of the bio-physical environment such as flora, fauna, aquatic ecosystem etc. The human environment aspects were taken to have "high value" due to their intrinsic value in addition to others.

Step 2:

The second step was to describe and evaluate the magnitude of potential project impacts, measured in terms severity, time (duration) and space (site-specific, local, national, regional, international) as well as probability/risk of the impact to occur. The magnitude of impacts was evaluated on a scale from 'large negative' to 'large positive' as illustrated below.

Phase	**Magnitude of Impacts**
	Large neg. Medium neg. Minimal / no Medium pos. Large pos.
Planning	------▲------
Construction	------▲------
Operation	

Step 3:

The final step combined 'value' (step 1) and 'magnitude of impacts' (step 2) to obtain the 'overall impact assessment' (step 3) as illustrated in Figure 2 below. This assessment evaluates the importance of an impact on a scale ranging from 'very large negative' to 'very large positive'.

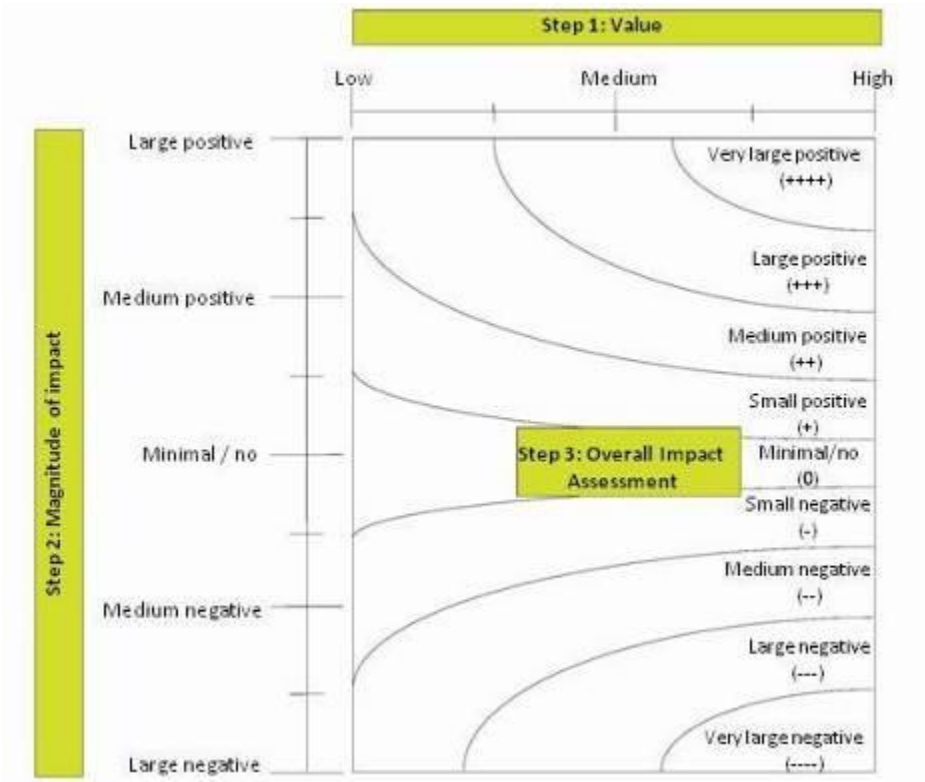


Figure 2: Summary of Impact significance assessment methodology

2. CHAPTER TWO: PROJECT DESCRIPTION

2.1 Name/Title of project

The proposed improvement of selected roads links and junctions/intersections in Kampala City under the Second Kampala Institutional and Infrastructure Development Project.

2.2 Project objective

The main objective of the project is to improve mobility in Kampala and spur economic growth for all. The project will address critical bottlenecks that impede mobility in Kampala City and the surrounding areas.

2.3 Justification for the project

Kampala City has approximately 1200km of roads of which about 450km (38.0%) are paved and 750.0 (62%) km are unpaved. A significant portion of the unpaved network is heavily trafficked with over 300 vehicles per day. With the ever increasing traffic volumes it is becoming very expensive and unsustainable to maintain them in unpaved state. Almost 80% of the paved roads and 99% of the unpaved roads are in fair-to-poor condition due to a heavy maintenance backlog. The roads are characterized by potholes, distortions, cracks, etc., and the level of service is low. Localized repairs have become extremely expensive and uneconomical with roads breaking up in a short time after routine repairs.

Traffic congestion in the city is fast growing due to a combination of poor roads network, uncontrolled junctions, and insufficient roads capacity which is out of phase with the increasing traffic (vehicular and pedestrian) on Kampala roads. This congestion results into higher vehicle operating costs, long travel times and poor transport services. The overall city aesthetics and quality of life is highly compromised by the dilapidated paved roads and sidewalks, unpaved shoulders and unpaved roads which are sources of mud and dust that hovers over large sections of the City. There is therefore need signalize junctions/intersections and expand or reconstruct or upgrade the roads.

2.4 Nature of the project

The proposed project is a road construction project that will involve signalization of selected junctions and dualling/reconstruction/paving of selected roads. It is of a nature described under section 3 (Transportation) of the Third schedule of the Guidelines for Environmental Impact Assessment in Uganda that details projects to be considered for ESIA. Basing on the explanation provided under Section 5.4.1.1 of this report, the project has been taken to be under category B Projects described under the World Bank Operational Policy 4.01 Environmental Assessment.

2.5 Location of the project

The project roads/junctions are divided into Group 1 and Group 2 as shown in Appendix VI. Group 1 roads and junctions are to be improved before those under Group II. Except Kabuusi-Kitebi-Bunamwaya road and Ssuna road-2 that are located in Wakiso District in Makindye Ssabagabo Subcounty, all the project roads and junctions are located in Kampala District in all the five divisions, Kawempe, Central, Nakawa, Lubaga and Makindye. The location of each road/junction is presented under Table 10, Table 17 and Appendix VI and VII.

2.5.1 Priority Roads

For the implementation of the project, priority will be placed on construction of the following roads from Group 1.

Table 5: Priority Roads & Junctions

Road Name	From	To	Length
Port Bell Rd	Nakawa Jnctn	Portbell Pier	6.7
Old Port Bell / Spring Rd	Wampewo R/About	New Portbell Rd	3.4
Nakawa Ntinda Rd (includes Ntinda Jnctn)	Nakawa-Spear Motors (Jinja Rd)	Kiira Rd	2.8
John Babiha / Accacia Avenue	Yusuf Lule Rd	Kiira Rd	1.75
Sir Apollo Kaggwa Rd	Bwaise at KNBP	Nsalo Rd	3.4
Lukuli Rd	Kayemba Rd	Salaama Rd	7.8
Kabuusu-Bunamwaya-Lweza Rd	Kitebi Rd	Seguku Rd	8.5
Kulambiro Ring Rd	Northern Bypass	Kisasi Rd	4.7

2.6 Project status and duration

The project is divided into phases scheduled as follows;

Phase	Scheduled/probable duration
Preliminary and detailed engineering design	2015 to 2017
Construction phase	May 2017

The project is currently in its final engineering design phase, the Environmental and Social Impact Assessment and Resettlement Action Plan having been completed.

2.7 Project Land Requirements

The project will require small amounts of land take outside the existing road corridors for roads to be expanded. The total land take of the project will be established following completion of the detailed engineering design stage of the project. It is a project requirement to take as little land as possible, so as to minimize the cost of land procurement.

2.8 Project Cost

The total cost of the project will be established following completion of the detailed engineering stage of the project and Resettlement Action Plan. However the estimated construction cost for Group I Roads that are to be upgraded first is UGX 135,800,853,785.

2.9 Project Components/facilities

2.9.1 Project Equipment and materials inputs and outputs

2.9.1.1 Project inputs

The equipment and materials expected to be used during the implementation of the project are presented in Table 6 below.

Table 6: Project equipment and materials

Equipment
Graders (x4)
Rollers (x6)
TLB's (x4)
Trucks (x16)
Excavators (x2)
Asphalt pavers (x2)
Wheeled loader (x4),
Generators (X6),
Crane Trucks (x4),
Augured Pile Rig (x2)
Materials
Crushed rock for base layer, concrete aggregate and asphalt
Sand for concrete
Gravel for layer works
Water for construction
Cement

All raw materials will be hauled by trucks using the City's roads.

2.9.1.2 Project outputs

One of the major outputs of the project will be waste generated during the construction activity. Expected waste to be generated will comprise of Concrete and brick rubble, Old pipes, Spoil material (gravel and soils) and Asphalt (mostly reworked into new layer works). Most spoil material will be disposed of at the municipal dump disposal sites

2.9.2 Project equipment/Material storage areas and Workers' accommodation sites

Sites where equipment and construction material can be safely stored will be required. Project equipment will need to be located at a specific site. Materials that would require storage would include cement, lime, bitumen, oils, lubricants, petrol, diesel, explosives, sand, aggregates, gravel, traffic signs, guard rails, concrete products (culverts, kerbs, marker posts, elevated platform etc.), road markings and bitumen adhesives. In addition, contractor employees that will be engaged in the road project will need accommodation.

2.9.3 Quarries and Borrow Areas

Quarries are areas where rocks for road construction are excavated and prepared while borrow areas are those from which murram or gravel for filling of low lying areas is excavated. It is expected that the material to be used for the project construction activities will be obtained from these places. Five borrow areas and 3 quarry sources were identified during the preliminary investigations the locations of which are presented in the Table 7 and Table 8 below. Location maps of the Gravel borrow sources are presented in Appendix VIII.

Table 7: Details of Gravel Borrow sources

Borrow Area	Distance from Kampala Town	Offset	Material Description	Estimated Available Quantity (m^3)	Material testing remarks	Environmental and social findings
Seguku Zone 4	10Km	0.8Km from Seguku-Bunamwaya road	Clayey Gravels	60,000	Recommended for Subgrade	The site is situated amidst human settlement, near the Parish Catholic Church, telecommunication mast, Yesu Akwagala (babies' home, church, and training school), Kings Primary School, and well established residential, rental and commercial areas. It is currently fenced off and inactive with reported land owner conflicts. It is surrounded by shrub land.
Seguku Zone 5	10Km	1.5Km from Seguku-Bunamwaya road	Clayey Gravels	14,000	Recommended for Subgrade and Treated Subbase	Located in majorly residential and commercial area separated by the main road (from Lweza Entebbe road-Bunamwaya). It is a virgin area where murram has never been excavated. The site lies on a sloppy terrain and is being used mainly for growing of food crops. A few natural trees exist at the site.
Seguku Katale	10Km	2.3Km from Seguku-Nalumunye road	Clayey Gravels	20,000	Recommended for Subgrade and Treated SubBase	Commonly known as 'Jomayi estate land'. It covers close to 13 acres. Small scale farming is practiced. It is hilly and human settlements surround it in the slopes/valleys. The closest human settlement is within 5m of the site. There is

						a telecommunication mast within the site. Although it has extensively supplied murram both previous and current, it can still provide the same material.
Natete Nakawuka	22Km	11.5Km from Nateete-Kibuye road	Clayey Gravels	72,000	Recommended for Subgrade and Treated SubBase	This site is no longer in operation and was reported to have been sold by the former owner to somebody intending to put up structures on it. It is characterized by herbaceous plants and it neighbours farmland. No structures were seen within 400 metres of the site.
Namanve Industrial Park	12Km	1.8Km from Kampala-Jinja road	Sandy Clays	450,000	Recommended for Subgrade and Treated SubBase	The site is located in the heart of many industries both functional and newly constructed. No agriculture nor human settlement as well as institutions were seen within proximity to the site. A degraded wetland lies at the site boundary.

Table 8: Details of quarry sources

Quarry No.	Name	Owner / Supplier	Location	Distance from Kampala CBD (km)	Geology	Status	Remarks	Environmental and social findings
Q-01	Gentex	Energo	Kigoogwa-Matugga	16Km	Granitoid Gneiss	Commercial	Suitable	-
Q-02	Stirling	Stirling	Mukono-Mbalala	30Km	Granite Gneiss	Commercial	Suitable	The site is situated far away (more than 300m) from human settlements and

								institutions.
Q-03	Seyani	Seyani	Gayaza-Nakasaja Road	25Km	Gneiss Granite	Commercial	Suitable	The site borders major institutions including Buntaba Primary School, Rehman college, a catholic church and health centre. The schools are separated by a perimeter fence. There are households within a 200m radius of the site. Crop farming (Banana, cassava, maize, sweet potatoes) was observed in the nearby areas but at household or small scale level. EIA and environmental auditing have been conducted for operation of the site (Appendix IX). NEMA asked the company to address some non-conformities following the environmental audit. It is recommended that as a minimum before deciding to use the quarry, the developer obtains the latest NEMA inspection report plus details of any measures that the company operating the quarry/borrow pit has put in place to comply with the inspection findings

Most of the borrow areas are existing commercial sources areas which have been used for fill and capping layers. The identified quarry sites are all currently in operation. Before deciding which quarries and borrow pits to use, the developer/contractors will obtain not only the necessary approvals/operation permits of the sites but also the latest NEMA inspection reports plus details of any measures that the company operating the quarry/borrow pit has put in place to comply with the inspection findings.

2.9.4 Sand sources

Two sand deposit areas have been identified for provision of sand for the construction activities, one at Kasanje I and another at Kasanje II. Both sites are in operation. They lie in a central forest reserve (Kalangalo Central Forest Reserve) and within a wetland area. It was not established whether Kasanje I site meets statutory requirements such as possession of a wetland use permit and NFA license by the owners as well as EIA and auditing requirements. However Kasanje II site was reported to have a wetland use permit and NFA license. Other sand sources should be identified outside the forest reserve.

In case the contractors' opt to open up fresh sand sources, they will be required to obtain all the required approval requirements from the relevant lead agencies. Contractors will not be allowed to use these sources until evidence of the required permits and approvals is provided.

2.9.5 Runoff drainage outlets

The project will involve extension/construction/repair of road bridges, culverts, and other drainage structures. Two bridge structures, one on Kayemba road and another on New Portbell road are to be upgraded.

2.9.6 Access roads

Temporary access roads may have to be constructed in cases where the identified borrow areas or the any construction camps are not served by existing roads.

2.9.7 Construction water sources

Two potential construction water sources for the project have been identified, Port bell landing site and at Ggaba on Lake Victoria shores.

2.9.8 Project Labour

The project will employ a number of workers both skilled and unskilled in positions such as, road engineers, project supervisors, Environment Health and safety officers, potters, security guards etc. The expected number of workers is as below;

- Skilled: 230
- Unskilled: 320

Measures are proposed in this report on ensuring equitable access to job opportunities for Ugandans.

2.9.9 Project designs

2.9.9.1 Road classification

The roads under the Project have been classified in accordance with the KCCA Road Classification Criteria, with the project roads falling in the KA to KI classes described in Table 9 below.

Table 9: Description of Road classification

Road Category	Description	Traffic Lanes (m)	Shared Path (cycle land and pedestrian walkway)(m)	Kerb and Channel	Median Island	Road Lighting
KU	Urban Expres	4 x 3.50	2 x 2.00	√	√	√
KA	Arterial Road	2 x 3.50	2 x 4.00	√	-	√
KB	Collector Road	2 x 3.25	2 x 4.00	√	-	√
KC	Local Road	2 x 3.25	2 x 4.00	√	-	√
KI	Industrial Road	2 x 4.00	2 x 1.50	√	-	√

2.9.9.2 Designs

The preliminary designs for all the project roads were completed. A summary of the design considerations including classification per road are presented in the Table 10 below. The final design layouts for Group I roads and junctions that are to be improved first are presented in Appendix X.

Table 10: Design consideration for the project roads

Road name	Description	Proposed design details
Kayemba Road	The road starts at Lubiri Ring Road (N0452479, E0033218) and it spans a length of 2 Km up to the junction with Namasoole Road (N0453458, E0032342) all in Makindye Division. The road crosses Katwe Road, but there is currently no provision made for motorists to cross Katwe Road. The road is partly surfaced, and partly gravel. After that the road passes underneath Queen's Way via a narrow pedestrian underpass structure, which allows thoroughfare only to pedestrians and motorcycles. After this crossing the road becomes a pedestrian walkway. Then follows a second narrow pedestrian underpass structure that passes underneath a railway line. This underpass structure is wide enough so that small passenger cars can fit through, so there is access from the portion of Kayemba Road east of the railway line to Queen's Way. Currently only motorists and motorcyclists gain accesses to Queen's Way. The portion of Kayemba Road that follows after the railway line is gravel, and in poor condition. This portion terminates at the junction with Namasoole Road. The road has an Average Annual Daily Traffic (AADT) of 8943	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KC classification with street lights, a design speed of 50 and carriage way width of 6.50 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that there will not be enough space to allow for cycle lanes in the portion of Kayemba Road between the railway line and the junction with Namasoole Road. It is proposed to design a new structure that passes underneath the railway line. This structure will accommodate the full width of the upgraded road. It will have a vertical clearance of 3m. The existing vertical alignment will be raised in the portion of Kayemba Road between the railway line and the junction with Namasoole Road by 360mm to accommodate the new pavement design. The existing road cross section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile. The remainder of Kayemba Road will be designed to match the existing vertical profile.
Port bell Road	The road is a single carriageway, with a lane in each	The road is to be upgraded to dual carriageway with centre median and

Road name	Description	Proposed design details
	direction, and starts at Nakawa Junction (Jinja Road) (N0456768, E0036207) spanning up to Port bell Pier (N0461528, E0032161), with a length of 6.7km, all in Nakawa Division. It is currently surfaced, and functions as an urban arterial road with AADT OF 27706. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. It generally is in fair condition.	2 sidewalks. It will be under KU classification with street lights, a design speed of 50 and carriage way width of 14 metres. Three of the largest uncontrolled intersections on the road will be upgraded to signalized intersections. There is an existing Road-over-Rail structure near the Nakawa Junction, which will be widened to accommodate the new carriageways. Provision will be made in the vertical geometry for the planned widening of the existing structure to accommodate the Standard Gauge Railway Project, currently being planned by the Uganda Railway Corporation. There will be no provision made to accommodate the Standard Gauge Railway under this project. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design.
Old Port bell Road/Spring Road	The road is a single carriageway, with a lane in each direction, and starts at Wampewo Roundabout (N0458248, E0035362) spanning up to New Port Bell Road (N0455002, E0035151) with a length of 3.4 km, all in Nakawa Division. It is currently surfaced, and functions as an urban arterial road with AADT OF 24686. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. It generally is in fair condition.	This Road is to be upgraded to dual carriageway, with centre median and 2 sidewalks. This will make provision of access to the properties that currently gain access from this road problematic. It will be under KU classification with street lights, a design speed of 50 and carriage way width of 14 metres. Three of the largest uncontrolled intersections will be upgraded to signalized intersections. There are two railway crossings along the road, both at-grade. One is a disused spur, and the other is the existing railway line to Jinja in the east of Uganda. Both will remain at-grade crossings, with upgraded signage. Provision will be made in the vertical geometry for a planned additional crossing to accommodate the Standard Gauge Railway Project, currently being planned by the Uganda Railway Corporation. The vertical alignment will be kept close to the existing road profile in the proposed crossing area. The existing vertical alignment will be raised elsewhere by 300mm to accommodate the new pavement design. The existing road cross

Road name	Description	Proposed design details
		section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Sir Apollo Kagwa Road	The road starts in Bwaise at the Kampala Northern Bypass (N0451360, E0038513) and it spans a length of 3.4Km up to Nsalo Road (N0451800, E0035178), all in Kawempe Division. It is currently surfaced, and functions as an urban arterial road with AADT of 28410. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is paved, and generally in fair to poor condition, with many potholes.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KA classification with street lights, a design speed of 50 and carriage way width of 6.50 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Sentema Road	The road starts at Wakaliga Road (N 0450802, E 0034287) and it spans a length of 4.2Km up to Nothern Bypass (N0447731, E 0036690), all in Lubaga Division. It is currently surfaced, and functions as an urban arterial road with AADT of 17200. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is paved, and generally in fair to poor condition, with many potholes.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KA classification with street lights, a design speed of 50 and carriage way width of 6.50 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile. It is also envisaged that the proposed vertical profile will exceed the maximum allowable grade as mentioned in Table 33, along some parts of the road. It is proposed to accept this variation, due to the fact that the resultant cut that will result from dropping the grade to the absolute value stated in Table 33 will negatively accept the accesses to the properties that gain access from this road in the affected areas.

Road name	Description	Proposed design details
Kabuusu-Kitebi Bunamwaya Road	This road starts at Entebbe Road (N 0449442, E 0024798) Lweza Clays and it spans a length of 8.5 Km up to the A109 (N0450081, E 0032843). The first half of the road falls in Wakiso District outside the KCCA's jurisdiction, and is unsurfaced, and in very poor condition. The second half falls in Lubaga Division, and is surfaced, and in fair condition. The road functions as urban arterial road with AADT of 34083. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road.	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KA classification with street lights, a design speed of 50 and carriage way width of 6.50 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile. It is also envisaged that the proposed vertical profile will exceed the maximum allowable grade as mentioned in Table 33, along some parts of the road. It is proposed to accept this variation, due to the fact that the resultant cut that will result from dropping the grade to the absolute value stated in Table 733 will negatively accept the accesses to the properties that gain access from this road in the affected areas
Kulambiro Ring Road	The road starts just north of the roundabout at Nothern Bypass (N0455982, E0040531) and it spans a distance of 4.7Km forming a ring up to Kisaasi Road (N0455800, E0040844) all in Nakawa Division. The road functions as a collector road with AADT of 7900. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KC classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Namungoona Road	The road starts at Masiro Road (N0449886, E0036423) and ends at Nakibinge Road (N0449178, E0037900) with a length of 1.7km all	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KC classification with street lights, a design speed of 30 and

Road name	Description	Proposed design details
	in Lubaga Division. The road functions as a collector road with AADT of 7664. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Nakawa Ntinda Road	The road is a single carriageway, with a lane in each direction, and starts at Jinja Road at Nakawa Spear Motors (N0457473, E0036886) and it spans a length of 2.8 km up to Kiira Road (N0457051, E0039264), all in Nakawa Division. It is currently surfaced, and functions as an urban arterial road with AADT of 10165. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. It generally is in poor condition, with many pot holes and edge breaks along the road.	This road is to be upgraded to dual carriageway, with centre median and 2 sidewalks. This will make provision of access to the properties that currently gain access from this road problematic. It will be under KU classification with street lights, a design speed of 50 and carriage way width of 14.0 metres. The uncontrolled intersection with Bukoto-Ntinda Road will be upgraded to signalized intersection. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
John Babiha/ Accacia Avenue	The road is a single carriageway, with a lane in each direction, and starts at Yusuf Lule Road (N0454054, E0037402) and it spans a distance of 1.75 Km up to Kiira Road (N0453894, E0035178) all in Central Division. It is currently surfaced, and functions as an urban arterial road with AADT of 29716. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is surfaced, and still in fair condition.	This Road is to be upgraded to dual carriageway, with centre median and 2 sidewalks. It will be under KU classification with street lights, a design speed of 50 and carriage way width of 14.0 metres. This will make provision of access to the properties that currently gain access from this road problematic. The uncontrolled intersection with Kiira road will be upgraded to signalized intersections. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section is flat to fairly steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical

Road name	Description	Proposed design details
		profile. Some realignment of accesses and road intersections on the low side of the road is expected.
Ssuna road-2	The road starts at Nyanama, Muzito Road (N0450555 E0030128) and it spans a distance of 3.7 Km up to the Zzana roundabout on Entebbe Road (N0451269, E0027915). It is currently surfaced, and functions as collector road with AADT of 11208. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is surfaced, and very narrow in parts. It is in fair condition. The road falls in Wakiso District, outside the jurisdiction of the KCCA.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Sezibwa road	The road starts at Fairway Junction on Yusuf Lule Road (N0453879, E0035877) and it spans a distance of 0.8 Km up to Kintu Road (N0453693, E0035137) all in Central division. It is currently surfaced, and functions as collector road with AADT of 19323. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is surfaced, and still in good condition.	This Road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Muzito road	The road starts at Kabuusu-Kitebi-Bunamwaya (Wankulukuku) Road (N0449484, E0030532) and it spans a distance of 2.2 Km up to Entebbe Road	This Road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way

Road name	Description	Proposed design details
	(N0451520, E0030639) all in Lubaga division. It is currently a surfaced road, and functions as collector road and is in fair condition with AADT of 16191	width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is however expected that space will be lacking, therefore a reduced cross section is proposed. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Eight Street/ Namuwongo Road	The road starts at Mukwano Road (N0454718, E0035057) and it spans a distance of 2.8 Km up to Bukasa Road (N0456966, E0033962) all in Makindye division. It is currently a surfaced road, and functions as an industrial road, and is in fair condition with AADT of 23512. Various properties gain direct access from the road.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KI classification with street lights, a design speed of 30 and carriage way width of 8.0 metres. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is generally steep, and it is expected that access to adjacent properties will be jeopardised by the raising of the vertical profile. It is therefore proposed that the vertical profile is not raised along this road.
Lukuli Road	The road starts at Kayemba Road (N0454817, E0034755) and it spans a distance of 7.8 Km up to Salaama Road (N0453596, E0032023) all in Makindye division. It is currently a surfaced road, and functions as a collector road, and is in fair condition with AADT of 3056. Various properties gain direct access from the road.	This Road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.50 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is generally steep, and it is expected that access to adjacent properties will be jeopardised by the raising of the vertical profile. It is therefore proposed that the vertical profile is not raised along this road.
Luwafu road	The road starts at Mobutu Road (N0453768, E0031156) and it spans a distance of 2.6 Km up to	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB

Road name	Description	Proposed design details
	Salaama Road at (N0454619, E0029472), all in Makindye Division. It is currently a gravel road, and functions as collector road, and is in fair condition with AADT of 9445.	classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is however expected that space will be lacking, therefore a reduced cross section is proposed. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Ntinda-Kisasi	The road starts at Ntinda Junction (N0457028, E0039275) and spans a length of 1.8 Km up to the roundabout on the Kampala Northern Bypass at (N0455798, E0040830), all in Nakawa Division. It is currently surfaced, and functions as an urban arterial road with AADT of 5517. Various properties and businesses gain direct access from the road, and there are several uncontrolled intersections along the road. The road is paved, and still in fair condition.	This Road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KA classification with street lights, a design speed of 50 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Buwambo/Kitezi road	The road starts at Gayaza Road, Mpererwe (N0452843, E0042466) and spans a length of 4.3 Km up to Kitagobwa Road at (N0452150, E0046444), all in Nakawa Division. It is currently surfaced, and functions as a collector road with AADT of 14909. Various properties and businesses gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and in fair condition.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.

Road name	Description	Proposed design details
Naguru road	The road starts at Lugogo Bypass (N0455781, E0036568) and spans a length of 1.8 Km up to Katalima Road at (N0457003, E0036696), all in Nakawa Division. It is currently a surfaced road, and functions as a collector road, and is in fair condition with AADT of 10946. Various properties gain direct access from the road.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Katalima road	The road starts at Jinja Road (N0457067, E0036548) and spans a length of 2.6 Km up to Ntinda 2 Road at (N0456919, E0038048), all in Nakawa Division. It is currently a surfaced road, and functions as a collector road, and is in fair condition with AADT of 12398. Various properties gain direct access from the road.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile, though it is expected that the current surface drainage will be improved by the raising of the vertical profile.
Sixth Street	The road starts at the Press House Road roundabout (N0454896, E0034845) and spans a length of 1.8 Km up to Fifth Street at (N0456665, E0034625), all in Central Division. It is currently a surfaced road, and functions as an industrial road, and is in fair condition with AADT of 7536. Various properties gain direct access from the road.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KI classification with street lights, a design speed of 30 and carriage way width of 8.0 metres. It was initially proposed to raise the existing vertical alignment by 300mm to accommodate the new pavement design, however the existing road cross section is very flat. Therefore it is expected that access to adjacent properties, as well as the surface

Road name	Description	Proposed design details
		drainage of storm water will be jeopardised by the raising of the vertical profile, and it is therefore proposed that the vertical profile is not raised along this road.
Seventh street	The road starts at the Press House Road roundabout (N0454923, E0034808) and spans a length of 1.8 Km up to Fifth Street at (N0456589, E0034532), all in Central Division. It is currently a surfaced road, and functions as an industrial road, and is in fair condition with AADT of 6702. Various properties gain direct access from the road.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KI classification with street lights, a design speed of 30 and carriage way width of 8.0 metres. It was initially proposed to raise the existing vertical alignment by 300mm to accommodate the new pavement design, however the existing road cross section is very flat. Therefore it is expected that access to adjacent properties, as well as the surface drainage of storm water will be jeopardised by the raising of the vertical profile, and it is therefore proposed that the vertical profile is not raised along this road.
Fifth Street	The road starts at Seventh Street (N0456607, E0034522) and spans a length of 1.1 Km up to Spring Road (N0456861, E0035461), all in Central Division. It is currently a surfaced road, and functions as an industrial road, and is in fair condition with AADT OF 16965. Various properties gain direct access from the road.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KI classification with street lights, a design speed of 30 and carriage way width of 8.0 metres. It was initially proposed to raise the existing vertical alignment by 300mm to accommodate the new pavement design, however the existing road cross section is very flat. Therefore it is expected that access to adjacent properties, as well as the surface drainage of storm water will be jeopardised by the raising of the vertical profile, and it is therefore proposed that the vertical profile is not raised along this road.
Bukoto-Ntinda Road	The road is a single carriageway, with a lane in each direction, and the portion under consideration starts at the Kabira Country Club (N0455388, E0038883) and it spans a distance of 1.77 Km up	This Road is to be upgraded to dual carriageway, with centre median and 2 sidewalks. This will make provision of access to the properties that currently gain access from this road problematic. It will be under KA classification with street lights, a design speed of 50 and carriage

Road name	Description	Proposed design details
	to Kiira Road (N0456957, E0039573) all in Nakawa Division. It is currently surfaced, and functions as an urban arterial road with AADT of 28558. Various properties and businesses gain direct access from the road, and there are several uncontrolled intersections along the road. The road is paved, and still in fair condition.	way width of 7.0 metres. It is expected that there is not sufficient space available to fit the proposed cross section in the available space. The uncontrolled intersection with Nakawa Ntinda Road will be upgraded to a signalized intersection. The alternative is a reduced cross section, without the raised centre median. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is flat to fairly steep, and it is expected that access to adjacent properties will be jeopardised by the raising of the vertical profile. Some realignment of accesses and road intersections on the low side of the road is expected.
A109	The road starts at Clock Tower and spans a length of 6.5 Km up to Masaka-Kampala Road, all in Lubaga Division.	This Road is to be upgraded to dual carriageway, with centre median and 2 sidewalks. This will make provision of access to the properties that currently gain access from this road problematic. It will be under KA classification with street lights, a design speed of 50 and carriage way width of 14.0 metres.
Lungujja road	The road starts at Old Mubende Road and spans a length of 2.5 Km up to Makamba Road, all in Lubaga Division.	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows.
Kigala road	The road starts at Lungujja Road and spans a length of 1.1 Km up to Wakaliga Road, all in Lubaga Division.	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows.
Kyebando ring 2	The road starts at Kyebando Ring Road 1	This road is to be upgraded to surface, and will remain a single

Road name	Description	Proposed design details
	(N0453344, E0038918) and ends at Kyebando Ring Road on the opposite side of the hill (N0453672, E0039832), all in Kawempe Division. The road functions as a collector road with AADT of 2356. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 8.0 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Muteesa I Road	The road starts at Balintuma Road (N0451059, E0035845) and spans a length of 2.2 Km up to Albert Cook Road (N0450304, E0033998), all in Lubaga Division. The road functions as a collector road with AADT of 5127. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Mugema Road	The road starts at Masaka Road (A109) (N0446808, E0033619) and spans a length of 3.7 Km up to Sentema Road at (N0448749, E0035906), all in Lubaga Division. The road functions as a collector	This Road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes

Road name	Description	Proposed design details
	road with AADT of 6150. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Kabega Road	The road starts at Hanlon Road (N0454137, E0032982) and spans a length of 1.2 Km up to Kirombe Road (N0455009, E0032672), all in Makindye Division. The road functions as a local road with AADT of 5195. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in poor condition.	The road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Kirombe road	The road starts at Nsambya Estate Road (N0454946, E0032880) and spans a length of 2.1 Km up to Lukuli Road at (N0455277, E0030943), all in Makindye Division. The road functions as a local road with AADT of 5215. The road is gravel, and generally in poor condition.	The road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section.

Road name	Description	Proposed design details
		Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Kisasi road 2	The road starts at the roundabout on Bahai Road (N0455046, E0041114) and spans a length of 2.5 Km up to Waliggo Road at (N0453958, E0042247), all in Kawempe Division. It is currently surfaced, and functions as a collector road with AADT of 5417. Various properties and businesses gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and in fair condition.	The road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Wamala Road	The road starts at Entebbe Road (N0451959, E0031541) and spans a length of 4.5 Km up to Mutundwe Road (N0448288, E0030138), all in Lubaga Division. The road functions as a collector road with AADT of 2365. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	The road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road

Road name	Description	Proposed design details
		cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Old Mubende	The road starts at Busega, Masaka Road (A109) (N0446110, E0034120) and spans a length of 4.8 Km up to Wakaliga Road (N0449500, E0333652), all in Lubaga Division. The road functions as a collector road with AADT of 3161. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	This road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Ssuna road-1	The road starts at Entebbe Road (N0452198, E0032083) and spans a length of 4.2 Km up to Wamala Road (N0450547, E0030138), all in Lubaga Division. The road functions as a collector road with AADT of 8148. Various properties gain direct access from the road, and there are several uncontrolled intersections along the road. The road is gravel, and generally in fair to poor condition.	This Road is to be upgraded to surface, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KB classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is expected that several properties will be impacted by the wider cross section. Therefore it is proposed that a reduced cross section be applied, to minimise this impact. The existing vertical alignment will be raised by 360mm to accommodate the new pavement design. The existing road cross section varies generally between flat and steep, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.

Road name	Description	Proposed design details
Tuba road	The road starts at Kulambiro Ring Road (N0457009, E0042428) and it spans a distance of 1.0 Km up to Unknown Road (N0456850, E0043342) in Kkungu Village, all in Nakawa Division. It is currently a gravel road, and functions as local road with AADT of 818.	This road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KC classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is however expected that space will be lacking, therefore a reduced cross section is proposed. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.
Kulambiro-Najeera	The road starts at Kulambiro Ring Road (N0457271, E0042067) and it spans a distance of 0.7 Km up to Unknown Road (N0457882, E0042370) in Najeera, all in Nakawa Division. It is currently a gravel road, and functions as local road with AADT of 3098.	The road is to be reconstructed, and will remain a single carriageway, with a lane in each direction and 2 sidewalks. It will be under KC classification with street lights, a design speed of 30 and carriage way width of 6.5 metres. Provision will be made for cycle lanes in each direction, where available space allows. It is however expected that space will be lacking, therefore a reduced cross section is proposed. The existing vertical alignment will be raised by 300mm to accommodate the new pavement design. The existing road cross section is generally flat, and it is not expected that access to adjacent properties will be jeopardised by the raising of the vertical profile.

2.9.9.3 General design standards

Two options were considered for each of the design elements in column 1 of the table 11 below.

Table 11: Road design standards

Design Element	Urban/Peri-Urban Option 1	Urban/Per-Urban Option 2
Design speed	50	30-70
Minimum stopping sight distance	60	60
Minimum passing sight distance	345	140
Minimum horizontal curve radius	100	60
Max. Gradient (desirable)	9	9
Max. Gradient (absolute)	11	11
Minimum Gradient in cut	0.5	0.5
Maximum super elevation	4	3
Crest Vertical curve stopping	9	9
Crest Vertical Curve passing	126	20
Sag vertical curve stopping	11	11
Normal cross-fall	2.5	2.5
Shoulder cross-fall	4	2.5
Right of way	30	30

Column 2 of the table above presents standards as per the MoWT General Specification for Roads and Bridge Works the design standard required to be used for the project while column 3 presents revisions proposed by the design engineer.

2.10 Project activities

2.10.1 General project activities

The project will generally involve the following activities;

- Signalisation of selected junctions presented in Appendix VI
- Construction of a traffic control centre at City Hall, linking all signalized intersections
- Reconstruction and dualling of selected roads presented in Appendix VI
- Reconstruction (recycling and overlaying/upgrade to concrete) of selected roads presented in Appendix VI and;
- Upgrading of selected roads presented in Appendix VI to paved standard.

- Ancillary works including street lighting as indicated

2.10.2 Pre-construction activities

2.10.2.1 Construction Material Investigations

Material investigations involve field visits and collection of construction materials for laboratory tests. During the investigations, sub-grade soils, base material and sub-base materials under the existing alignments/junctions are tested. The investigations also involve identification and collection of material from murram borrow pits and quarry sites, excavation and collection of materials from test pits along the road alignments and junctions, collection and testing of materials in swamps, among other activities.

2.10.2.2 Surveying

Surveying involves detailed topographical surveys along the proposed project route (s) and cadastral surveys to identify land and properties that will be affected during construction phase. It also involves the establishment of the centerline of the road and marking the limit of the current road reserve or new alignments and new land take over limits for the Right of Way. Minor clearance of vegetation may also be done to facilitate access for the surveying team.

2.10.2.3 Road inventory

Road inventory involves the recording of the condition of all items and features along the project roads including junctions, land use patterns, road structures, drainage structures, and terrain types, among others.

2.10.2.4 Traffic and other data collection

This activity involves collection of all traffic data, patterns, loads and movements on the existing roads. It also includes cross sectional traffic count, junction counts, origin destination studies and axle load surveys.

2.10.2.5 Land Acquisition

The dualling of selected roads will require land which is currently being used for other purposes to be acquired. The land to be acquired temporarily or permanently may include land under the new alignments, land for borrow sources, access roads, equipment and material storage sites, workshops, and worker's camps.

2.10.2.6 Recruitment of labour

Labour will have to be recruited in order to undertake the various project activities.

2.10.2.7 Design and Desk work

This involves analysis of all field data and the detailed design of the road works including the design of the traffic control centre at City Hall Kampala.

2.10.2.8 Relocation of utilities (electric poles, water pipes, etc)

This will involve relocation of any public utilities that may be within the Right of Way before commencement of construction on each road.

2.10.3 Construction phase

2.10.3.1 Land Clearance

For roads to be dualled, this will involve clearing of trees and bushes, demolishing structures within the alignment prism. All material cleared will have to be disposed of in approved dumping areas or within the right of way.

For roads to be reconstructed, this will involve ripping the roads of the existing material and reusing it in the reconstruction.

For junctions to be signalized, this will involve ripping of the junction at particular points of the existing material to clear points to placement of traffic light poles.

2.10.3.2 Runoff drainage outlets

The project will involve extension/construction/repair of road bridges, culverts, and other drainage structures.

2.10.3.3 General earthworks

The general earth works will include;

- Demolition of small concrete structures where new alignments (for roads to be dualled) will be accommodated
- Clearing of vegetation and stripping of topsoil over the corridors where new alignments (for roads to be dualled) will be accommodated, over the borrow/quarry areas to be used for

acquisition of construction materials and over areas that may be used for construction of workshops and workers camps.

- Excavating the road formation in cuts and then using the material if suitable to form the compacted embankment layers
- Excavating spoil material that is unsuitable to form the road bed and replacing it with suitable materials from cuts or borrow areas.
- Filling of low areas
- Excavating side drains, catch water drains, offshoots, outfall drains and foundations of other drainage structures.
- Scarifying and compacting the existing material if suitable to form the sub-grade in cuts or laying and compacting selected sub-grade materials.

2.10.3.4 Borrow pit operations

Borrow material is used where the amount of material obtained from cuts cannot cover sections of fills, and low-lying areas such as swamps. Consequently borrow pits are often identified during construction. Borrow pit operations include clearance of vegetation and stripping of topsoil at the identified sites, excavation of materials from borrow pits, and stock-piling of materials, among other activities.

2.10.3.5 Quarry operations

The quarry operations involve use of explosives to blast rocks at quarries, crushing of rocks, sorting and piling of crushed aggregate for road construction. They also include setting up and operation of asphalt plants.

2.10.3.6 Surfacing

This involves laying of an asphaltic concrete (AC) wearing course or surface dressing of the roads to be paved. Prior to application of the AC surfacing, a bituminous prime coat is applied on the base layer. Application of a surface treatment involves spraying hot bitumen on the road surface followed by placing single size aggregates which range from 6 to 20mm. Bitumen is heated using electricity, firewood, diesel or gas.

The application of an AC surfacing involves spraying a thin film of tar coat followed by the laying of a hot mixture of aggregates, filler, and bituminous binder prepared at predetermined proportions mostly in a stationery plant.

2.10.3.7 Ancillary works

The other activities expected to be undertaken during the construction phase include kerbing, pipe laying, hauling, road markings, placing of road signs (sign boarding) and guardrails, street lighting among others.

2.10.4 Post construction activities

The post-construction phase involves mainly the roads' operation and maintenance activities carried out by the developer in order to ensure optimization of road operations. It includes both routine and periodic maintenance works. Routine maintenance works includes pothole patching, cleaning of drainage items, repairs of broken road items including maintenance of street lights, among others. The periodic maintenance items are carried out after a scheduled period of time. These include re-sealing, re-painting of road markings, among other activities. Other post-construction activities include enforcement of road rules and other control requirements.

3. CHAPTER THREE: EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS OF THE PROJECT AREA

3.1 Project area and general land use

Except Kabuusi-Kitebi-Bunamwaya road and Ssuna road-2 that are located in Wakiso District in Makindye Ssabagabo Subcounty, all the project roads and junctions are located in Kampala District in all the five divisions, Kawempe, Central, Nakawa, Lubaga and Makindye. The location details of each road/junction is presented under Table 9, Figure 2, Appendix IV and Appendix V. The project roads and junctions are typically in an urban setting with majority being bordered by mainly buildings.

3.2 Bio-physical and Socio-economic and cultural environment

Under this section, the physical, biological and socio-economic environment for all the project roads and junctions is described. This includes district/regional and site specific descriptions. Some project roads and junctions that are linked were clustered based on their linkages and as such most site specific descriptions for those roads and junctions is presented as per the clustered roads and junctions. The clusters are presented in Appendix XI.

3.2.1 Physical Environment

3.2.1.1 Climate

The selected roads and Junctions being located in Kampala and Wakiso Districts are characterized typically by Kampala District and Wakiso District Climate.

According to the Kampala District State of Environment Report, 1997, the climate of Kampala District is humid tropical type though strong elements of equatorial conditions are normally experienced in the district. The district receives an annual rainfall of between 1750mm and 2000mm distributed in two peaks, one being March to May and the other September to November. The district has a mean rainfall of at least 50mm in every month with January and February being drier than other months. The rainy days are highest in April. However, even during the drier months occasional heavy rains are received leading to a fair distribution throughout the year. The district has considerably high temperatures with an annual average of 21.9°C. Temperature peaks are in the months of January to March and October to December, the former being higher.

Relative humidity is high in Kampala District due to its equatorial position, high rainfall and proximity to Lake Victoria. It is highest in the early hours of the day and reaches the minimum diurnal values in the afternoons. Kampala District experiences winds in form of a slight breeze felt on face or detected

by leaves rustle with speeds of about 3m/Sec. The winds of the district are, however, modified by increased surface roughness due to numerous hills and tree vegetation in the district. However, the district experiences localised strong winds in form of eddies during the dry season and the rainstorms accompanied by strong breezes and moderate gales that often lead to breaking of tree branches (Kampala District Local Government, 1997).

In Wakiso District, the rainfall is bi-modal. There are two wet seasons running from April to May and October to November. The dry months are January to February and July to August. The annual rainfall mean is 1320 mm though in many areas of the lake zone is between 1750 and 2000mm. The minimum surface air temperature is 11.0 degrees centigrade while the maximum is 33.3 degrees centigrade. There is little variation in temperature throughout the year. There are two temperature peaks, one from the months of January- May and the other from July to September. The highest temperatures are experienced in the month of February whereas the lowest temperatures are experienced in the month of July (Wakiso District Development Plan 2010/11-2014/15).

3.2.1.2 Topography and Geology and soils

The selected roads and Junctions' area being located in Kampala and Wakiso Districts are characterized typically by Kampala and Wakiso District topography and geology described below.

Except for the tiny portions underlain by recent deposits of alluvial and lacustrine formations, the rest of Kampala District is underlain by the pre-cambrian rock system. The largest portion of the district is underlain by the Basement Complex System of mainly undifferentiated gneisses with some granites. The Buganda series underlie a small band of the area stretching from Najjanankumbi through the northern part of Nsambya to Nakawa, Banda and a tiny stretch of the area from Lusaze to Kyambogo. The cenozoic rocks of the Holocene series comprise swamp deposits, alluvium, and lacustrine deposits near the lake shore. Laterite "carapace" is widespread on Kampala hills. It is well developed below the summit levels where it forms protective pavements on many slopes.

Except for a small proportion in the lowland which is covered by alluvial and lake deposits, the soils of Kampala district are ferralitic representing an almost final stage of weathering with little or no mineral reserve left. Almost 82% of Kampala district is covered by Buganda soil catena while Kabira/Katera soil catena and Kaku soil series cover about 11% and 7%, respectively. The Buganda Catena is the most important soil mapping unit in Kampala District. It is characterised by ferruginised soils on the summits and above the laterite caps, shallow to rocky surface on the steep upper slopes and deep loamy soils on the more gentle middle slopes. The Kabira catena occurs in close association with Buganda catena occupying the south eastern and western parts of Kampala District (near the Lake). The Katera series on the other hand occupy the Lake Victoria shore while Kaku series are alluvial and more or less permanently water logged soils. They occur in the river valleys of the western part of Kampala district including Lubigi and Nabisasiro.

Wakiso District landscape belongs to Buganda surface classification. It lies at an approximate range of about 900 to 1340 meters above sea level. The district is characterized by isolated flat-topped hills with steep slopes, often merging abruptly into long and gentle pediments, which are usually dissected by relatively broad valleys. Wakiso District is divided into two main topographic zones, the Lake Victoria zone and the high land zone (central and northern hills).

Wakiso District is underlain by both old and recent rock systems, which include Precambrian, Cenozoic and Laterites. All the three major divisions of rocks i.e. sedimentary, igneous and metamorphic are represented. The Cenozoic rocks extend southwards to the Lake Victoria shores and river valleys of the district. They include mainly swamps deposits, alluvium and lacustrine deposits. The laterite rocks are widespread on Wakiso summits in the central and northern parts of the district. It is well developed below the summit levels where it forms protective pavements on many slopes.

The soils in Wakiso District are generally of high productivity and are mainly sandy clay soils. The dominant soils types are red gravely looms with occasional murram, reddish brown sandy loam on red clay loam and yellowish sands with quartz grave. The soils in the wetlands include grey sands whose parent material is alluvium and hill wash, grey coarse sand from lake deposits, black and grey clays from river alluvium and peat sands and clay formed from papyrus residue and river alluvium.

Soil analyses were undertaken at each road. Results indicate that most of the roads comprise fine-grained sandy clays which have Plasticity Indices (PI) between 15 and 20. The materials can generally be classed as intermediate to low plasticity clays. CBR's ranging from 5 to 10 were reported for these materials, which classifies them as either S3 or S4 subgrades. In some instances, the sampled material was very moist, and over-optimum.

During the trial pit investigation, areas of material unsuitable for use in road works were found. These areas are to be isolated and the material excavated and spoiled prior to the construction of the new layer works. The results of the soil analyses are presented in Appendix XII.

The penetration rates through the various gravel layers in the base, sub base and lower pavement layers vary significantly, but generally confirm that these natural gravels are suitable for use only as selected layers in a new pavement. Penetration rates on Old Port bell, Port bell, Kayemba, Eighth, Lukuli and Kulambiro Roads showed several values below 10%, which probably indicate soft spots in the underlying layers. These areas will have to be isolated and treated accordingly.

3.2.1.3 Hydrology and drainage

Kampala city is built on a number of hills with a topography controlled by differential weathering of various grades of sedimentary bedrock types. The topography results in thin weathered mantles of limited extent which produce shallow, localized groundwater flow systems with relatively short residence times (ARGOSS, 2002). Kampala city has a shallow aquifer from the weathered regolith. The springs that arise from the shallow aquifer are the major source of groundwater supply within the city. Springs supply about 50% of Kampala's population with the majority of these occurring in high-density settlement areas. 16% (32km^2) of Kampala district is covered by wetlands. These wetlands are part of the Lake Victoria catchment and the Victoria Nile catchment which encompasses major wetlands like the Lubigi and Nalubaga wetlands. Many of the wetlands in Kampala occupy shallow valleys between the many hills within the district.

Wakiso District is generally endowed with adequate surface and sub-surface water reserves with numerous streams, rivers and wetlands both permanent and seasonal. Minor valleys have distinct seasonal swamps and rivers, which contain water especially during the wet season. The water table along these swamps is quite high. They are suitable for sinking shallow wells. Sub surface water reserves occur in fissures and aquifers of the rocks. This is indicated by the number of boreholes, spring wells, tube wells and shallow wells, which have been drilled to harvest water for domestic supply (Mpigi District Local Government, 1997).

Drainage systems

There were wetlands observed along Wamala, Ssuna II, Muzito, Kirombe, Tuba, Kulambiro – Najeera, Port bell, Ntinda-Nakawa and Mugema roads. The wetland by Wamala road joins Nalukolongo stream that flows into Lubigi Wetland. The wetland is still quite intact. The wetlands by SSuna II Road and Muzito Road join Lufuka stream, Kaliddubi swamp, Kawagga swamp before joining Lake Victoria. The wetland by Kirombe road drains into Lake Victoria. The wetland by Tuba road is fed by Nalubaga stream crossing the wetland which eventually ends in Lake Victoria. The stream observed on both sides of Nakawa-Ntinda road joins Kinawataka stream that eventually joins Lake Victoria (Figure 3). The Nakivubo channel is the main stormwater drainage channel for Kampala city draining more than 95% of the city. The Nakivubo channel discharges into Murchison Bay, Lake Victoria. Other outfalls from the project roads include; Nabisisasiro channel, Nsooba channel, Nalubaga channel, kinawataka, Lufuka, Mayanja, Lubigi, Kansanga and Kitante as shown in table 12 below.

Table 12: Project Roads and Drainage Outfalls

Project Designation	Road	Outfall
G1RE-1	Sir Apollo Kagwa Road	Nassoba Canal & Nakivubo Channel
G1RE-3	Kayemba	Mayanja Channel
G1RE-2	Sentema Road	Nabisisasiro Channel
G1D-3	Portbell Road	Nakivubo Channel
G1D-4	Old Portbell Road	Nakivubo Channel
G1D-5	John Babiha/Acacia Avenue	Kitante Channel
G1RU-2	Kulambiro-ring road	Nyanjerade & Nalubaga Channel
G1RE-4	Lukuli Road	Kansanga Channel
G1RU-3	Namungona Road	Lubigi Canal
G2RE-7	Eight Street	Nakivubo Channel
G2RE-13	Katalima Road	Kinawataka
G2RE-9	Luwafu road	Mayanja
G2RE-6	Muzito road	Lufuka
G2RE-12	Naguru Road	Nakivubo Channel
G2RE-15	Seventh Street	Nakivubo Channel
G2RE-4	Sezibwa Road	Nakivubo Channel
G2RE-3	Suuna 2 Road	Lufuka

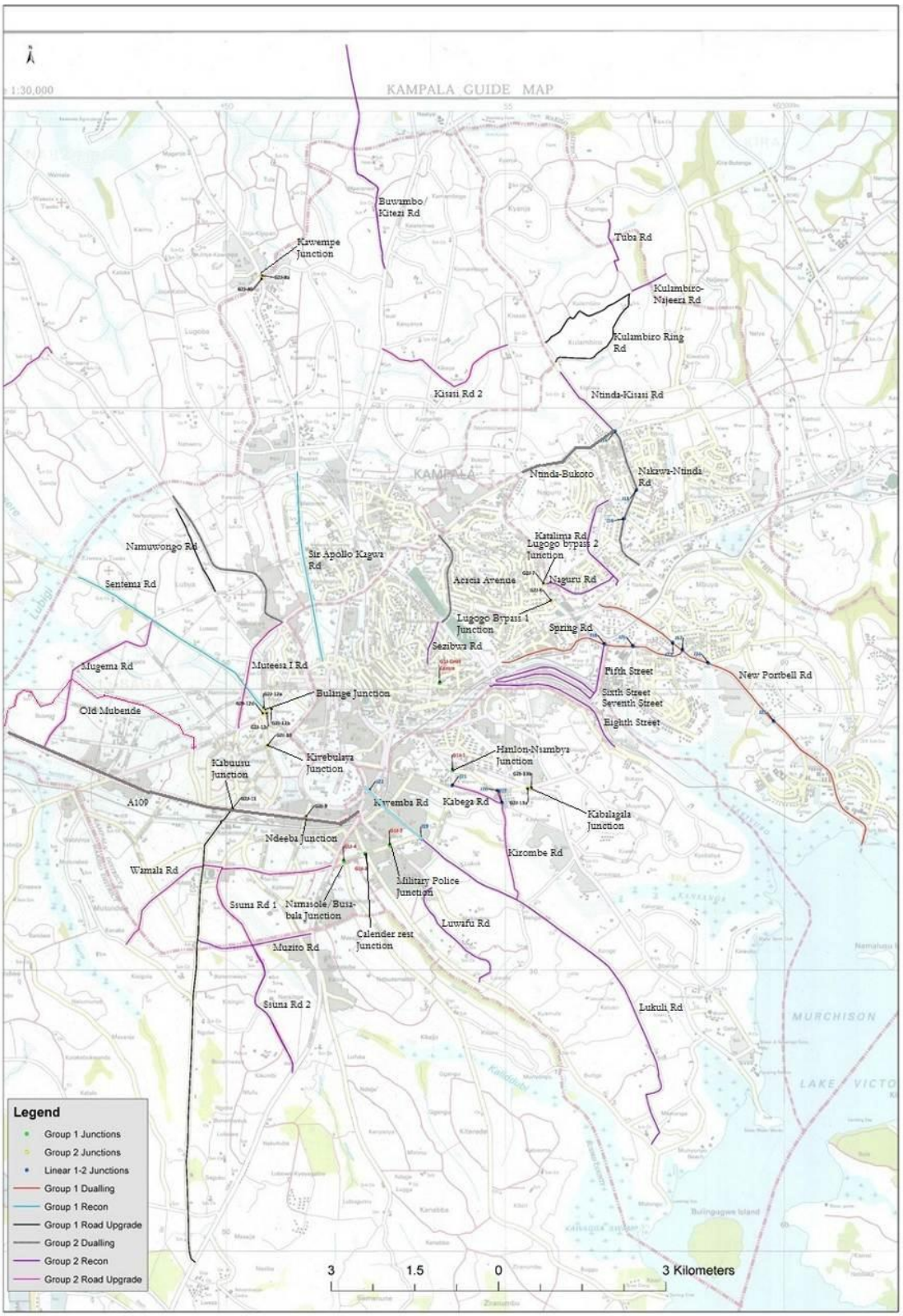


Figure 3: Water sources along the project roads

The various drainage structures found on the roads include concrete and corrugated metal pipes, UPVC pipes and box culverts. Side drains include stone pitched channels. Most of the culverts and stone masonry lined side drain channels were found to have the following problems:

- Inadequate sizes
- Broken pieces
- Silting
- Rusting for metal culverts
- Lack of headwalls
- Lack of inlet and outlet channels
- Inadequate invert levels
- Inadequate soil cover
- Poor Location

The majority of this infrastructure will require replacement during upgrade of the project roads.
KCCA have requested that the longitudinal open drains located adjacent to the existing roads be replaced with longitudinal concrete pipes and catch pits off the roadway. This is considered a viable solution given the safety risk to motorists and pedestrians associated with the open drains.

3.2.1.4 Water quality

The water sources along the project roads that will be affected by the project activities include springs, streams, water channels, wetlands and the Lake Victoria.

Almost all the wetlands are already deemed degraded to some extent (Kampala District Local Government, 1997). Protected springs are susceptible to pollution related to anthropogenic activities even when notionally "protected" (KSSMP, 2004). Previous studies undertaken on the protected springs in Kampala indicate widespread faecal contamination (Howard *et al.*, 2003; Barrett *et al.*, 2000 and Barrett *et al.*, 1998). These findings demonstrate microbiological contamination to be most severe during rainy (recharge) season. It is observed that the principal route of contamination of the protected springs is the immediate surrounding area and that localized sources of pollution are the major contributors to groundwater quality deterioration.

The contamination sources of the springs and surface water sources in Kampala are noted to result from solid waste dumps, low coverage of excreta disposal facilities (pit latrines) resulting in indiscriminate disposal of faecal matter into the environment (drainage channels, solid waste dumps and surface water), stagnant surface water due to inadequate management of storm- water runoff, and domestic animals such as goats, cows, pigs and chicken especially in the low income peri-urban settlements. Rainfall in this case is the primary climatological control factor, as it will aid both the

washing in of contaminants to the backfill area and replenishment of the contaminated surface waters.

The results of the water quality analysis for the 15 sampled water sources along the project roads presented in Table 13 and Appendix V were compared with the national standard for potable water (untreated water) which is in line with the WHO guidelines for drinking water. All the 15 samples tested were within the acceptable limits as compared to the national standard for potable water for the following parameter; total dissolved solids, electrical conductivity, nitrate, orthophosphate and bi carbonate (with the exception of port bell stream). All the parameters measured from Wamala sample were within permissible limits of the national standard for portable untreated water.

The water sample from Old Mubende showed high concentrations of total iron (2.7 mg/L) as compared to national standards (1.0 mg/L). This could be because of corrosion of iron from the water pipes of the spring.

The sample from Port bell Stream showed a very high concentration of $CaCO_3$ (942 mg/L) compared to the national standard for Bi-carbonate (500mg/L). This stream water is considered very hard water because it's more than 180 mg/l (McGowan, 2000). The high $CaCO_3$ concentration in the stream could be resulting from seepage and runoff from soils that contain limestone.
The turbidity values for the water samples from Muzito water channel, Tuba stream , Kulambiro/Najeera stream, Kirombe water channel, A109 water channel and Old Mubende spring were higher those recommended by the national standards for portable water. These water channels are open and close to the road so they end up becoming turbid due to storm water pollution from these roads. The streams are also close to human settlements therefore activities like agriculture especially near Kulambiro/Najeera and tuba streams lead to high sediment loads entering the water especially during rainy season due to storm water runoff.

With the exception of Wamala sample, the rest of the water samples showed high concentration of total suspended solids. This could be attributed to the fact that these water sources accumulate dust due to their proximity to the road. The high concentration of total suspended solids from the water channels at Kirombe, spring road, A109, Muzito and Ssuna is because they receive storm water run off which comes loaded with suspended solids.

With the exception of Wamala and Sentema samples, the rest of the samples showed high concentrations of fecal coliforms as compared with the national standard for portable untreated water. The sample from Kirombe water channel had the highest concentration of fecal coliform. These high concentrations could be attributed to the uncontrolled discharge of sewerage and runoff contaminated with human and animal waste from the area. This is an indication of poor sanitation in the area.

Table 13: Water quality analysis results

Parameter	Mugema Wetland	Tuba Stream	Tuba Wetland	Old Mubende spring	Kulambiro /Najeera Stream	Kirombe water channel	Muzito water channel	A109 Water channel	Suna II Water channel	Wamala spring	Sentema spring	Nakawa/Ntinda stream	Portbell Stream	Portbell Lake	Portbell wetland	National Standards for portable water (untreated water)
pH	7.75	7.68	6.98	8.11	7.46	8.25	8.24	7.43	6.79	5.64	5.84	7.02	8.54	6.92	7.54	6.5-8.5
Total dissolved solids (TDS)	323	186	157	227	409	438	358	298	192	73	107	200	1002	115	267	1200
Total Suspended Solids(TSS)	19	30	59	150	11	18	25	19	6	0	1	6	8	4	7	0
Fecal Coliforms	$27*10^4$	4000	$1*10^4$	$1*10^4$	4500	$52*10^4$	$8*10^4$	$6*10^4$	$4*10^4$	3	5	3250	$25*10^4$	$1*10^4$	520	0
Electrical Conductivity (EC)	505	291	245	354	639	684	560	465	300	114	168	312	1566	179	417	2500
Total Iron	1	0.61	1.2	2.7	1.2	0.45	0.55	0.76	0.35	0.1	0.01	0.46	0.32	0.71	0.15	1.0
Nitrate	0.62	0.13	0.14	0.03	0.69	0.04	0.45	0.02	0.43	0.3	0.61	1.0	0.01	0.08	0.58	5.0
COD	9	5	4	11	6	50	13	3	14	5	7	10	15	8	5	Not specified
BOD_5	6.32	1.53	1.0	9	2.1	32	8.52	0	10.3	2.56	4.45	3.6	10.2	5.4	2.36	Not specified
Ortho Phosphate: Reactive	0.4	0.21	0.2	0.7	0.2	3.0	0.52	0.21	0.6	0.15	0.25	0.31	0.66	0.24	0.18	5.0
Bi-carbonate: as $CaCO_3$	190	137	161	385	151	303	244	205	107	24	20	93	942	88	176	500
Turbidity	20	31	62	15.6	12.5	19	25.2	20	7.12	0.58	1.2	7.16	10	5.49	7.31	10.0

3.2.1.5 Noise and Air quality

The results from the day time noise level and air quality measurements discussed here are presented in Appendix IV.

a. Cluster 1 (Kabuusu-Kitebi-Bunamwaya Road, Ssuna Road 1, Ssuna Road 2, Muzito Road, and Wamala Road)

All roads under cluster 1 had average noise levels above the recommended permissible limits. For example the average noise levels recorded near Gods plan supermarket and near Chicken to night restaurant were 68.8 dB (A) and 74.9 dB (A) respectively which is higher than 55 dB (A), the maximum permissible noise levels for Mixed residential areas.

The concentration of Particles of 2.5μm diameter for most of the sampled points along the roads and junctions under cluster 1 were within the air quality standards for World Health Organization which is 25μg/m^3 except at Sunrise Primary School located around coordinates 36 N 0449321 0025986 on Kabuusu-Kitebi - Bunamwaya road where measurements were taken along a dusty murram road. The concentration of particles of 10μm diameter in ambient air for all the roads and junctions under cluster 1 were above the air quality standard for WHO which is 50μg/m^3 except for Muzito road and a few areas along Kabuusu –Kitebi-Bunamawaya, Ssuna 1 and Wamala road.

b. Cluster 2 (Lukuli road and its junction; Kayemba-Lukuli, Kirombe road and its junctions; Kabega-Gogonya and Gogonya-Nsamba Estate, Kabega road and its junction; Hanlon-Kabega, Kayemba road and its junction; Kayemba-Katwe)

All roads and junctions under cluster 2 had noise levels above the recommended permissible limits. However, in some areas, noise levels were slightly above the recommended standards. For example along Lukuli road the average noise levels were 55.1 dB (A) at peace of mind kindergarten, 55.2 dB (A) at St Dennis Sebugwawo church of Uganda, and 53.6 dB (A) in upper Mawanga village out of 55 dB (A) which is recommended noise level for mixed residential and commercial areas. The only area which had noise levels within permissible limits was a mixed residential area in Tuba zone along Kirombe road with 54.4 dB (A).

Air quality along roads and junctions under cluster 2 for particles of 2.5μm diameter were within permissible limits except at Kayemba-Lukuli junction and some few points along Kayemba road.
The concentration of particles of 10μm diameter were above the air quality standard for WHO which is 50μg/m^3 except for some few areas along Kirombe road.

c. Cluster 3 (Tuba road, Kulambiro-Najeera road and Kulambiro Ring road)

Noise levels recorded around roads under cluster 3 were above the maximum permissible limits except a few areas for example a residential area around UTM coordinates 36 N 0456858 0043128 in Tuba village along Tuba road and a residential area around 36 N 0457739 0042279 in Najeera along Kulambiro-Najeera road that had noise levels below the maximum permissible standards, i.e. 41.6 dB (A) and 47.5 dB (A) respectively. The average noise levels recorded in some areas were slightly higher than the maximum permissible standards for example, 53.6 dB (A) at Pal and Lisa Secondary School along Kulabmbiro ring road, 53.3 dB (A) at Giggles preschool and Day care along Kulambiro-Najeera road, and 52.5 dB (A) at Kungu Seventh day church located along Tuba road.

The concentration of particles of 2.5µm diameter in ambient air for the roads under cluster 3 were within acceptable standard of 25µg/m^3 Tuba Village along Tuba road, Kulambiro Trading Centre, Kasaana Trading Centre, and Kibaati Trading Centre along Kulambiro-Najeera road. The concentration of particles of 10µm diameter were above the WHO Air Qulaity guidelines (50µg/m^3) except at Pal and Lisa Secondary School located along Kulambiro ring road.

d. Cluster 4 (Nakawa-Ntinda road and its junctions; Naguru junction, Matyrs way junction and Ntinda T/C, Ntinda-Kisasi road, Bukoto-Ntinda road and its junction; Magambo Junction)

Noise levels recorded around roads and junctions under cluster 4 were above the maximum permissible limits except at Peak Kindergarten located along Ntinda-Kisaasi road where noise levels were within maximum permissible limits i.e. 52.5 dB (A).

The concentration of particles of 2.5µm diameter in ambient air for the roads and junctions under cluster 4 were within the WHO air quality guidelines except for Ntinda-Kisaasi road.

e. Cluster 5 (Naguru road, Katalima roadand Lugogo bypass2 junction)

Noise levels recorded in areas around roads and junctions under cluster 5 were above the maximum permissible noise limits. It is only at Foot Print Nursery and Day care where the noise levels were slightly above the maximum permissible limits (58.7 dB (A)).

The concentration of particles of 2.5µm diameter in ambient air for the roads and junctions under cluster 5 were within the WHO air quality guidelines. The concentration of particles of 10µm diameter were above the WHO air quality guidelines.

f. Cluster 6 (Ssezibwa road, and Acacia Avenue/John Babiha road)

Noise levels around roads under cluster 6 were above the maximum permissible limits. It is only at DFCU Bank located along Acacia Avenue where the recorded noise levels were slightly above the maximum permissible levels (i.e. 57.2 dB (A)).

The concentration of particles of 2.5μm diameter in ambient air for the roads under cluster 6 were within acceptable limits and the PM10 levels were above the WHO guidelines.

g. Cluster 7 (Portbell road and its junctions; Mbuya Barracks junction, Super oil Mutungo junction and Bank of Africa Luzira Junction, Spring road and its junctions; Tuskys Bugolobi Junction, MTN Bugolobi junction and Shell Bugolobi junction)

Noise levels around these areas were above the maximum permissible limitys except at Nakumat Mall along old port bell road (52.5 dB (A)).

The concentration of particles of 2.5μm diameter in ambient air for the roads and junctions under cluster 7 were within acceptable limits. The PM10 levels were above the WHO air quality guidelines except for a few areas along the old and new port bell road i.e. Nakawa business park, Mbuya uphill college, Kyabazinga furniture center, Bank of Africa Luzira, Mr. Tasty restaurant in Bugolobi, Tuskys junction, and areas around the ministry of works and transport.

h. Cluster 8 (5th Street, 6th street, 7th street and 8th street)

Noise levels under Cluster 8 roads were within permissible noise limits except at National Water and Sewerage Corporation Offices along sixth street (78.6 dB (A)).

The concentration of particles of 2.5μm diameter in ambient air for the roads under cluster 8 were within acceptable limits. PM10 levels were above the WHO air quality guidelines except at Stanbic Bank along 5th street, National water and sewerage cooperation offices along 6th street and man truck offices along 7th street.

i. Cluster 9 (A109 road, Old Mubende road, Mugema road, Sentema road, Muteesa 1 road, Ndeeba junction, Kabuusu junction, Bulange Junction, Kigala road and its 2 junctions, Lungujja road and its 7 junctions)

Noise levels under cluster 9 roads and their junctions were above the maximum permissible noise limits except at Veronica Infant School located along Mugema Road. Some mixed residential areas along Old Mubende road had values slightly above the permissible noise limits (55dB (A)) i.e (58.2

dB (A)) at Twin Care Foundation School, 56.9 dB (A) at the shops near pacify hotel. Ndeeba, Kabuusu and Bulange junctions also had noise levels above the permissible limits.

The concentration of particles of 2.5µm diameter in ambient air for the Cluster 9 roads and their junctions and Kabuusu Junction were within acceptable limits except at Masanafu trading Centre located along Sentema road. The PM10 levels were above the WHO air quality guideline except for Mugema road, some few areas along Old Mubende road, a residential area located around UTM coordinates 36N 0448183 0033699 (Arc 1960) along Kigala road, and at International Tropical Institute located along Lungujja road. The concentration of particles of 2.5µm diameter in ambient air for Ndeeba Junction were outside acceptable limits. PM10 levels were above the WHO air quality guidelines for Ndeeba Junction. The concentration of particles of 2.5µm diameter in ambient air for Bulange junction were within acceptable limits. The PM10 levels for Bulange Junction were above the WHO air quality guidelines.

j. Sir Apollo Kaggwa road

Sir Apollo Kaggwa road had noise levels above the maximum permissible limits.

The concentration of particles of 2.5µm diameter in ambient air for Sir Apollo Kaggwa road were within acceptable limits except some few areas in Makerere A Village which had slightly higher values but still within the WHO interim targets. The PM10 levels for all points measured along the roads were above the WHO air quality guidelines.

k. Namungoona road

Namungoona road had noise levels higher than the maximum permissible limits except in one residential area indicated in Appendix XI.

The concentration of particles of 2.5µm diameter in ambient air for Namungoona road were within acceptable limits. The concentration of particles of 10µm diameter in ambient air for all points measured along the road were within acceptable limits except at Nakibinge trading Centre located around UTM coordinates 36 N 0449119 0038204.

l. Buwambo-Kitezi road, Kyebando ring 2, Luwafu road and Kisasi road 2

Noise levels around Buwambo-Kiteezi, Kyebando Ring 2, Luwafu and Kisaasi road 2 were above the maximum permissible noise limits except at Splendors School Day Care, Nursery and Primary School and at Universal High School where noise levels were witihin maximum permissible limits i.e. 51 dB (A) and 51.8 dB (A) respectively for a facility with in a mixed residential area.

The concentration of particles of 2.5μm diameter in ambient air for all the roads were within acceptable limits except at Namere trading Centre and Kiteezi trading Center located along Buwambo-Kiteezi road, Kitabuliki trading Centre located along Kyebando ring 2, and Ndugu trading Centre located along Kisaasi road 2.

m. Military Police Junction

Noise levels recorded around this area were higher than the Maximum permissible noise levels for day time.

The concentration of Particles of 2.5μm diameter at the junction were within the air quality standards for World Health Organization which is 25μg/m^3. The concentration of particles of 10μm diameter in ambient air at the junction were above the air quality standard for WHO which is 50μg/m^3.

n. Calender rest 1 Junction

The noise levels at the junction were above the recommended permissible limits.

Air quality at the junction for particles of 2.5μm diameter were within permissible limits. The concentration of particles of 10μm diameter were above the air quality standard for WHO which is 50μg/m^3.

o. Namasole/Busabala Junction

Noise levels recorded at the junction were above the maximum permissible limits.

The concentration of particles of 2.5μm diameter in ambient air at the junction were within acceptable standard of 25μg/m^3. The concentration of particles of 10μm diameter were above the WHO Air Quality guidelines (50μg/m^3).

p. Hanlon-Nsambya Junction

Noise levels recorded at the junction were above the maximum permissible limits.

The concentration of particles of 2.5μm diameter in ambient air at the junction were within the WHO air quality guidelines.

q. Lugogo bypass 1 Junction

Noise levels recorded at the junction were above the maximum permissible noise limits.

The concentration of particles of 2.5µm diameter in ambient at the junction were within the WHO air quality guidelines. The concentration of particles of 10µm diameter were within the WHO air quality guidelines.

r. Kabalagala junction

The noise levels at the junction were above the maximum permissible limits.

The concentration of particles of 2.5µm diameter in ambient air for at the junction were within acceptable limits. The PM10 levels were above the WHO air quality guidelines.

s. Kivebulaya Junction

Noise levels at the junction were above the maximum permissible noise limits except at Veronica Infant School located along Mugema Road.

The concentration of particles of 2.5µm diameter in ambient air at the junction were within acceptable limits. The PM10 levels were above the WHO air quality guideline.

t. Kawempe junction

Kawempe junction had noise levels higher than the maximum permissible limits except in a residential area along Namungoona road.

The concentration of particles of 2.5µm diameter in ambient air were outside acceptable limits. The concentration of particles of 10µm diameter in ambient air at the junction were outside acceptable limits.

Generally for the noise measurements, the maximum permissible noise levels for the measured points were not the same because of the values set by NEMA for different locations. For example 70dB (A) is the maximum permissible noise level for an industrial area, 50dB (A) for residential areas and 55dB (A) mixed residential in accordance with National Environment (Noise Standards and Control) Regulations, 2003. In trading centers and markets, noise levels were higher than the permissible levels. This was mainly due to other noise sources such people around the area, music in the nearby shops and vehicular movement.

Generally for the air quality measurements, the concentration of particles of 2.5µm diameter for most of the sampled points along the roads and junctions, were within acceptable limits and PM levels were above the WHO air quality guidelines thus air quality will definitely deteriorate during construction phase. Particulate emissions for areas around the unpaved roads were above the recommended air quality standards for World Health Organization. This was mainly due to dust generated by moving vehicles on the murram roads. However, in areas near the murram roads, for which measurements were taken on a rainy day, particulate levels were within acceptable limits even when the vehicles were moving on the roads.

3.2.2 Biological Environment

3.2.2.1 Flora and fauna

The vegetation of Kampala District follows the existing rainfall and relief pattern. The vegetation is a relic of the original vegetation where other than in the Central Division, there are remnants of communities related to the savannah woodland climax and the Combretum/Cymbopogon afronardus fire climax tree savannah, particularly on the hill tops.

The vegetation of Kampala District has been studied by the National Biomass Study (NBS) within the Uganda Forest Department dividing it into five major classes as follows:

i. Vegetation in Built-up Areas

This covers the largest part of Kampala District. It includes compounds and recreational grounds. Along the roads and around homesteads are trees that have been planted for both shade and ornamental purposes. The most common species are: *Cassia agnes, Markhamia platycalyx, Cassia gradus, and Jacaranda mimosifolia.* Other plant species include *Bougainvillaea* spp*, Acalypha* spp *and grasses such as Brachiaria* spp, *Hyparrhenia* spp.

ii. Subsistence Mixed Farmlands

This comprises of land recently or currently under use with or without trees and agricultural fallow areas. It ranks second in size to Vegetation in Built-up areas described above. The plants found in these farmlands are food crops which include cassava and maize. Fruit trees such as the mango and Jackfruit and other multipurpose trees integrated in the farming systems are found in the vicinity of homesteads. In some of the farmlands, an abundance of eucalyptus spp, *Markhania platycalyx* and *Musa* spp (bananas) are found. The dominant weeds in this sub-division include: *Digitaria scalprum, Oxalis latifolia, Commelina behgalensis, Imperata cylindrica, Cynodon dactylon* and *Euphorbia prostrata.*

iii. Woodland

This vegetation represents most wooded areas where trees and shrubs are the predominant cover. These are mostly of an average height of 4m. It is found mainly in parts of Nakawa division (Kireka). Wet woodland communities occur along wetlands (riverine forest) and the dry woodlands appear on the dry grass covered areas. Deciduous trees are also common. They include Eucalyptus spp planted under the peri-urban tree plantation program of Forestry Department, Musizi and *Markhamia platycalyx*.

iv. Bush land

This kind of vegetation is found in most divisions of Kampala District with an average height of less than 4m. The bushes, scrubs and thickets grow together as an entity. This vegetation also occurs on abandoned farmland in form of late fallow with rapid re-growth of mainly *Lantana camara*.

v. Wetland Vegetation

Kampala District has numerous wetlands covering 16% of the district (Kampala District Local Government, 1997). The major wetlands are associated with Lake Victoria and Kyoga drainage systems. They include Lubigi, Kiwembo, Nakivubo, Nsooba-Bulyera, Nalukolongo, Mayanja, Nabisasiro, Kansanga, Walufumba-Nalubega and Kirombe swamp systems.

Many wetlands around Kampala city have been drained and turned into agricultural areas or developed for commercial, industrial and sometimes residential purposes. The unclaimed swamps around Kampala city are covered by both grasses and sedges. The most common species are *Cyperus papyrus*, *Miscanthidium violaceum*, *Phragmites maurtianus*, *Cyperus latifolius* and *Typha australis*. Indicator tree species associated with this vegetation include *Acacia sieberana* and palms.

The challenge for the Uganda government is that, as population grows, resource use increases in line with changes in people's aspirations, values and socio-economic status, resulting in low awareness of the consequences of over-exploitation and impact on the environment (NEMA 2008). This has resulted into changes in distribution and status of fauna in recent years in the country and Kampala area has not been an exception. Many forest species have suffered during the destruction of such habitats, which still continues, with developments and the demand for resources being the main cause of this destruction. In Uganda, the forests near Kampala city have suffered most especially, Mabira, Ziika and Kifu forests. The drainage of swamps has had adverse effects of certain species especially the palearctic migrants that frequently use this habitat (Byaruhanga et al. 2005).

The destruction of good faunal habitat such as big trees, thickets and bushed grassland is a continuing process and this has left limited suitable habitat in the Kampala area. Due to these changes in habitat structure, certain species especially of birds have become more urbanized in

recent years and are now established in many Kampala gardens. These include the popular Marabou Storks, cattle Egret, Open-billed Stork, Woodland Kingfisher, Grey-backed Fiscal, Ruppell's Long-tailed Starling and Red-chested Sunbird among other species (Carswell 1986).

The Mammals on the other hand have suffered differently with most, if not all, of the large mammal populations disappearing from the area. Even the Impala, from which the Kampala area gets its name (Myetymology.com 2015), has not been recorded in the area in recent years.

The Primates in the Family Cercopithecidae especially the Red-tailed monkeys Cercopithecusascanius and Vervet monkeys Chlorocebuspygerythrus once frequent in the area are now very rare in the greater Kampala. The modification of the habitat has made it rather suitable for only the smaller mammals to come in, especially the Chiroptera (Bats), Soricomopha (Shrews, moles) and Rodentia (Rodents).Terrestrial mammals are key indicators of ecosystem health and providers of important ecosystem services (Ahumadaet al. 2011). So their absence in an ecosystem can be interpreted as an indicator of low productivity for that particular area in terms of ecosystem services.

Similar to mammals, birds are frequently considered as good biological indicators of wider biodiversity (Pearson 1995, Nalwanga 2012) being that they can be easily surveyed and are well known, among other reasons (Bibby et al. 2000). However, using birds alone for conservation planning is not a straightforward matter (Byaruhanga 2005) so this needs to be integrated with other taxa especially the plants that are determinants of the general ecosystem structure, and large mammals that are determinants of the value of the ecosystem services (Ahumada et al. 2011).

a. Cluster 1 (Kabuusu-Kitebi-Bunamwaya Road, Ssuna Road 1, Ssuna Road 2, Muzito Road, and Wamala Road)

Flora

The sides of the roads in cluster 1 were characterized by mainly vegetation in built up areas, followed by subsistence farmland, wetland, woodland and bush land vegetation types. Vegetation in built up areas was observed on all the roads. Vegetation in built up areas included shade, fence, ornamental, fruit, compound and road edge species. Subsistence farmland was observed on two of the roads namely; Ssuna II and Kabuusu-Kitebi- Bunamwaya. Wetland vegetation cover was observed on Ssuna II road, Muzito Road, and Wamala road while woodland and bushland (Plate 1) was observed on one road namely Kabuusu-Kitebi-Bunamwaya.

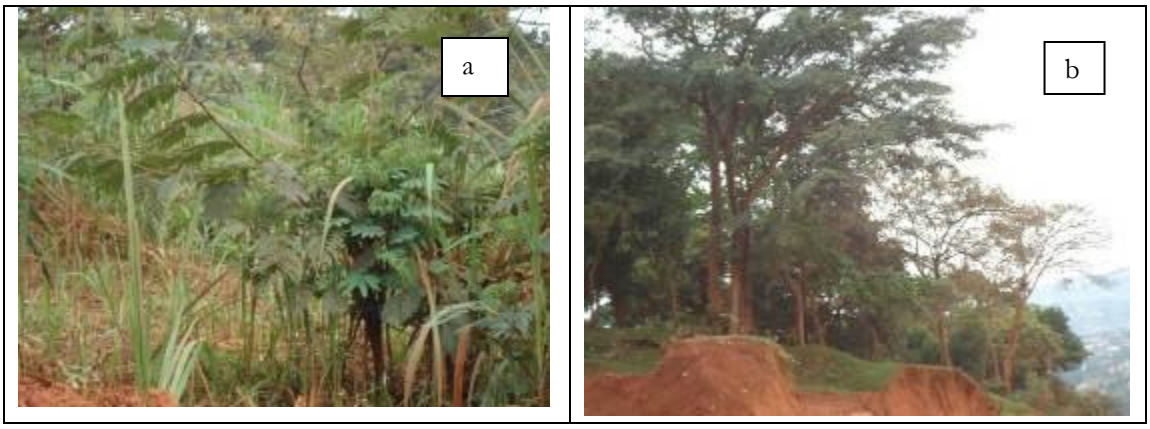


Plate 1: Bushland (a) and woodland (b) vegetation cover by Kabuusu-Kitebi-Bunamwaya Road

Ecologically sensitive areas were defined as those that contain unique features, maintain key natural processes, support rare plants or animals and their habitats or provide important breeding areas for wildlife (Ministry of Works, Housing and Communication, 1999). The only ecologically sensitive areas observed by the road sides in cluster 1 were wetlands observed along Ssuna II Road, Muzito Road, Wamala Road at UTM Arc 1960 0450651 0030133, 0450803 0030470 and 0448989 0037479 respectively.

The wetland along SSuna II Road is about 1 acre in size. The wetland joins Lufuka stream, Kaliddubi swamp, Kawagga swamp before draining into Lake Victoria. The eastern part of the wetland is heavily degraded with only a small portion still intact (Plate 2a). A big part of the wetland has been filled up for construction purposes (Plate 2b). Waste material has been dumped in the wetland on the eastern side of the road (Plate 2b). The size of the wetland is threatened by ongoing construction (Plate 2c). In the western side of the road, the wetland is quite intact with a stream (Plate 2d) used by the locals for domestic purposes. *Phragmites mauritianus* was the dominant plant species. Other dominant or frequent species recorded in the wetland included *Cyperus dives, Hibiscus diversifolius, Mimosa pudica, Acanthus polystachyus, and Canna indica.* The rare species observed in the wetland included *Aframomum sp, Coix lacryma-jobis, Leersia hexandra, Persicaria serrulata, Polygonum strigosum, Sesbania sesban*, *Typha latifolia, Triumfetta rhomboidea, Ludwigia Stolonifera, Cyphostemma adenocaula, Solanum* sp, *Xanthosoma sagittifolium, Solanum mauritianum, Ipomoea wightii and Alchornea cordifolia.* None of the species recorded in the wetland are of conservation concern in accordance with the IUCN 2015 red list. The habitat (wetland by Ssuna II Road) has been considered of low value considering its high current and potential level of degradation.

Plate 2: Wetland by Ssuna II Road: (a) Intact part on eastern side of the wetland; (b) Filled part of wetland with rubbish in some parts; (c) Construction of houses threatening the size of the wetland; (d) Stream on western side of the wetland

The wetland along Muzito Road is about 2 acres in size. The wetland joins Lufuka stream, Kaliddubi swamp, Kawagga swamp before joining Lake Victoria. The wetland is also heavily degraded with activities such as waste disposal, growing of crops and growing of trees. Some of the waste disposed of in the wetland included construction debris and polythene (Plate 3a). Crops/trees grown in wetland included yams, tomatoes, matooke, pawpaws, sugarcanes, maize and Eucalyptus sp. (Plate 3b). There is also on-going construction in the wetland (Plate 3c). Other plant species recorded at the site included *Cyperus dives, Leersia hexandra, Phoenix reclinata* which was rare, *Polygonum sp, Tithonia diversifolia, Colocasia esculenta, Cucurbota pepo, Ipomoea cairica, Ipomoea wightii, Astripomoea malvacea* and *Datura stramonium*. None of the species recorded in the wetland are of conservation concern as per IUCN 2015-4 Red list. The habitat has been considered of low value considering its high current and potential level of degradation.

Plate 3: Anthropogenic activity in wetland by Muzito road: (a) Waste disposal and eucalyptus in wetland; (b) Crops growing in wetland; (c) On-going construction on western side of the wetland

The wetland by Wamala road is about 1 acre in size. The wetland joins Nalukolongo stream that flows into Lubigi Wetland. The wetland is still quite intact. It is bordered by homesteads that are a threat to its survival (Plate 4). Eucalyptus trees were noted at its boundary. Species recorded in the wetland included *Acanthus polystachyus, Leersia hexandra, Phoenix reclinata and Typha sp, Alchornea cordifolia* and*Urena lobata*. None of the species recorded in the wetland is of conservation concern. The habitat has been considered of low value considering its small size and its relatively high current and potential level of degradation.

Plate 4: Wetland by Wamala Road

A total of 153 species, 54 Families and 127 Genera were recorded along the roads in cluster 1. Most of the species recorded were herbs accounting for 57% as indicated in Figure 4 below.

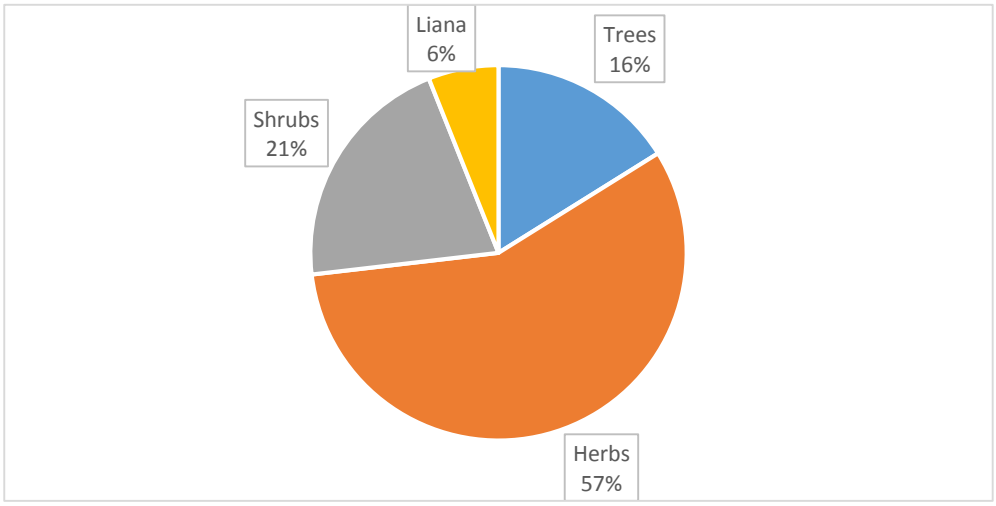


Figure 4: Distribution of plant species recorded under cluster 1 by life form

The full list of species recorded is provided in Appendix XIIIa. The most common species recorded under cluster 1 were *Cynodon dactylon, Persea americana, Amaranthus hybridus, Sida rhomboidea, Bidens pilosa, Ecalyptus sp, Leonotis nepetifolia, Markhamia lutea, Panicum maximum, Solanum incanum, Ageratum conyzoides, Ipomoea cairica, and Lantana camara* recorded on more than three roads in the cluster.Only one species of conservation concern with 1 individual was recorded that is, *Brugmansia suaveolens* on Wamala road (UTM Arc 1960; 0449161E 0031630N). *Brugmansia suaveolens*is is extinct in the wild. Fourteen known invasive species (Appendix XIIIa) were recorded including one major one; *Lantana camara* which was recorded on all roads except Suuna I.

Fauna

Altogether, 338 individuals of birds belonging to 45 species were recorded along the 5 roads surveyed in Cluster 1 (Appendix XIVa). Among this group, Kabuusu-Kitebi Bunamwaya road recorded the highest number of species (29) and individuals (106), followed by Wamala road with 23 species and 184 individuals (Table 14). The high richness and diversity of species is explained by the diversity of suitable habitats in areas along these roads.

Four sites recorded species of conservation concern. Among these, we had the splendid Starling and the Black and White Casqued Hornbill both Forest generalist (F) recorded on Kabuusu-Kitebi Bunamwaya Road. Others were Afrotropical migrants including the African Openbill recorded on Suuna Road 1 and White-throated Bee-eater recorded on Wamala Road among others recorded on Muzito road.

Kabuusu-Kitebi Bunamwaya road has a diversity of habitats inlucing woodlands suitable for a range of fauna including Species of conservation concern. The other habitats encountered along this road included bushes, gardens with a range of crops and a wetland which hosted a number of water/wetland birds including egrets and Marabou Storks. In the same way, Wamala and Muzito roads also had a high number of bird species and bird species individuals. These roads have a good number of trees in the area as well as some degree of vegetation cover suitable for biodiversity.

Table 14 Number of Bird Species and Individuals recorded along the roads and junctions Surveyed

Cluster/road	Road	Road/junction	Species	Individuals	C Species
1	Ssuna road-2	2C.3	11	52	0
	Muzito road	2C.6	13	66	2
	Kabuusu-Kitebi-Bunamwaya	RU.1	29	106	3
	Ssuna road-1	RU.11	13	30	1
	Wamala Road	RU.9	23	184	4
2	Kayemba road	2B.2	6	13	0
	Lukuli Road	2C.8	19	190	2

	Kayemba-Lukuli	2C.8j	3	8	0
	Kabega	RU.6	12	47	1
	Kirombe road	RU.7	12	29	1
3	Tuba road	RU.12	24	104	7
	Kulambiro-Najeera	RU.13	15	46	1
	Kulambiro Ring road	RU.2	12	31	1
4	Matrys way Junction (jcn)	2A.14	5	10	0
	Magambo Junction	2A.21	5	10	0
	Nakawa-Ntinda Road	2B.5	3	8	0
	Ntinda Junction	2B.5j	2	2	0
	Ntinda-Kisasi	2C.10	10	28	1
	Kiira road section (Bukoto-Ntinda)	2C.17	3	13	0
	Naguru Junction	2A.15	3	3	0
5	Naguru Junction	2A.15	3	3	0
	Lugogo Bypass Junction 2	2A.7	5	32	1
	Naguru road	2C.12	9	51	1
	Katalima road	2C.13	7	61	0
6	John Babiha/ Acacia Avenue	2B.6	11	51	0
	Sezibwa road	2C.4	7	19	2
7	Shell Bugolobi Jcn	2A.16	3	4	0
	MTN Junction	2A.17	4	18	0
	Bank of Africa Jcn	2A.18	4	22	0
	Super oil Mutungo Jcn	2A.19	6	13	0
	Mbuya Junction	2A.20	4	8	0
	Portbell road	2B.3	22	152	7
	Old Portbell road/ Spring road	2B.4	12	31	0
	Turskeys Bugolobi Jcn	2B.4j	4	6	1
8	Sixth Street	2C.14	5	49	0
	Seventh street	2C.15	7	17	0
	Fifth Street	2C.16	6	11	0
	Eight Street/ Namuwongo Rd	2C.7	8	33	0
9	Kabuusu Junction	2A.11	4	8	0
	Ndeeba Junction	2A.9	6	74	1
	Bulange Junction	2A.12	4	12	0
	Masaka road	2C.18	8	28	0
	Sentema road	2C.2	9	19	2
	Old Mubende	RU.10	16	37	1

	Muteesa I Road	RU.4	14	49	2
	Mugema Road	RU.5	23	80	1
10	Sir Apollo Kagwa	2C.1	11	44	1
11	Namungoona Road	RU.3	13	97	2
12	Buwambo/Kiteezi Road	2C.11	12	258	0
13	Kyebando ring 2	RU.33	12	28	1
14	Luwafu road	2C.9	9	46	0
15	Kisaasi road 2	RU.8	14	45	1

b. Cluster 2 (Lukuli road and its junction; Kayemba-Lukuli, Kirombe road and its junctions; Kabega-Gogonya and Gogonya-Nsamba Estate, Kabega road and its junction; Hanlon-Kabega, Kayemba road and its junction; Kayemba-Katwe)

Flora

The sides of the roads above in cluster 2 were characterized by mainly vegetation in built up area, followed by subsistence farmland and then wetland vegetation cover types. Vegetation in built up areas was observed on all the roads and all junctions except Kayemba-Katwe. It included shade, fence, ornamental, fruit, compound and road edge species. Subsistence farmland (crops) was observed on one road namely Lukuli. Wetland vegetation type was also observed on one road namely Kirombe.

The wetland along Kirombe road is located at UTM Arc 1960 0455017 0032188. It is about half an acre. The water draining from the wetland goes into Lake Victoria. However no surface water was seen in the wetland. It is heavily degraded with brick making activity (Plate 5). Wetland species were observed only by the channel at the border of the wetland. These included *Cyperus distans*, *Cyperus dives* which was dominant, *Cyperus luteus, Polygonum* sp which was frequent, *Ipomoea cairica*, *Galinsoga parviflora* which was frequent, *Aerva lanata, and Ludwigia stolonifera*. None of the species recorded in the wetland is of conservation concern. The habitat has been considered of very low value considering its high level of degradation.

Plate 5: Degraded wetland by Kirombe road

No ecologically sensitive habitat was observed for roads and junctions in cluster 2.

A total of 124 species distributed into 46 Families and 97 genera were recorded under roads and junctions in cluster 2. Most of the species recorded were herbs accounting for 54% of the species as indicated in Figure 5 below.

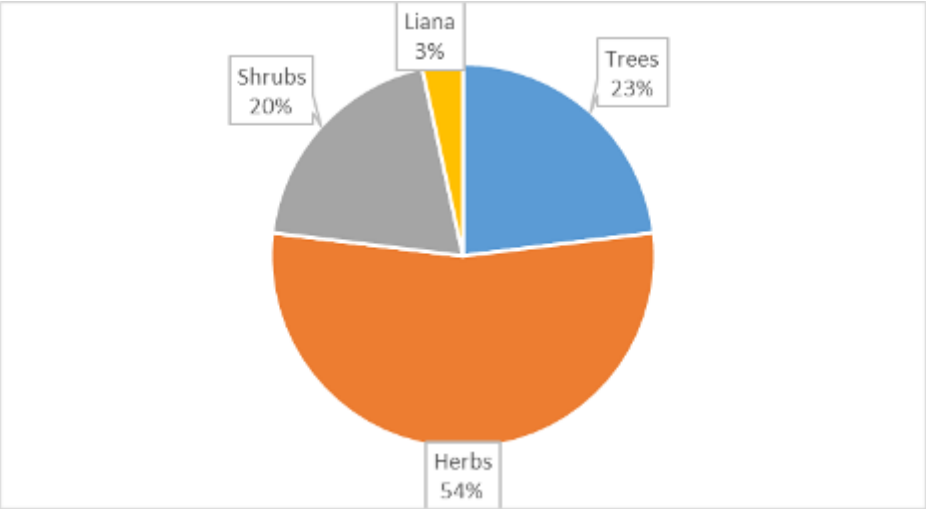


Figure 5: Distribution of plant species recorded under cluster 2 by life form

The full list of species recorded under cluster 2 is provided in Appendix XIIIb. The most common species recorded under cluster 2 were *Sida rhomboidea, Amaranthus hybridus, Cynodon dactylon, Ficus* sp, *Ipomomea cairica, Indigofera spicata, Thevetia peruviana, Bidens pilosa, Commelina* sp, *Markhamia lutea, Panicum maximum, Persea Americana, Solanum incanum, Leonitis nepetifolia, Mangifera indica, Psidium guajava, and Zea mays* recorded on more than two of the roads in the cluster.

Three species of conservation concern were observed on the roads in cluster 2. These are *Jacaranda mimosifolia, Canarium schweinfurthii* and *Juniperus procera. Jacaranda mimosifolia* recorded on Lukuli road (UTM Arc 1960; 0456848E 0030059N, 0456854E 0030041N, 0457173E 0029572N) and Kabega Road (UTM Arc 1960; 0454137E 0033256N) is of global conservation concern being listed on the IUCN 2015-4 red list as Vulnerable. *Canarium schweinfurthii* and *Juniperus procera* recorded on Kirombe (UTM Arc 1960; 0455213E 0031249N) and Lukuli Roads (UTM Arc 1960; 0453904E 0031983N, 0454060E 0031876N) respectively are not IUCN listed as threatened with extinction. However they are listed on National Forestry Authority (NFA) 'Reserved Species List'. Species on the NFA list are species which may be '…of international, national (or local) importance that are endangered, rare or threatened, and are '…declared by statutory order.' and shall be '…subject to such controls as the Minister (or District Council) may specify in that order' (Government of Uganda 2003). This is contained in The National Forestry and Tree Planting Act 2003, Article 30(1 & 2). Such species may not be cut, damaged, destroyed, disturbed or removed, collected, transported, exported, purchased, sold, or donated without the written consent of the Minister of District Council (Government of

Uganda 2003, Article 31, section 4a&b). In Uganda, NFA considers these species to be threatened owing to over-exploitation and hence need protection from harvesting and any other form of destruction which would lead to decline in their abundance.

Nine known invasive species (Appendix XIIIb) were recorded including one major one; *Lantana camara* which was recorded on Lukuli and Kirombe roads.

Fauna

A total of 31 species with 175 individuals were recorded on the roads surveyed in cluster 2. Lukuli road had the highest number of species (19) and Individuals, followed by Kabega and Kirombe road both with 12 species (Table 14). Among the species recorded, are seven species of conservation concern (C-Species) including one globally threatened species, the Grey Parrot recorded along Lukuli road (Appendix XIVb). In addition, four afrotropical migratory bird species were recorded in this cluster including African Openbill Stork on Kirombe road and Woodland Kingfisher on Kayemba road among others. The Hadada Ibis, Pied Crow, Common Bulbul and Ruppel's Starling were the species with the highest number of records for this cluster.

The roads with the highest species numbers are those with a reasonable number of trees and suitable habitat for fauna diversity. These are mainly roads in residential areas and smaller towns that have not undergone significant destructive developments that affect biodiversity. Many of them still have a good distribution of trees mainly in compounds and gardens, but also on the road sides.

c. Cluster 3 (Tuba road, Kulambiro-Najeera road and Kulambiro Ring road)

Flora

The sides of the roads in cluster 3 were characterized by mainly vegetation in built up areas, followed by subsistence farmland, wetland and bush land vegetation cover types. Vegetation in built up areas was observed on all the roads in the cluster. It included shade, fence, ornamental, fruit, compound and road edge species. Subsistence farmland (crops) was observed on two roads namely Tuba and Kulambiro ring. Wetland cover type was observed on two roads namely Tuba and Kulambiro-Najeera while Bush land was observed on only one road namely Kulambiro Ring.

The only ecologically sensitive sites were the wetlands observed along Tuba Road at UTM Arc 1960 coordinates; 0456880 0042956 and Kulambiro-Najeera road at Arc 1960 coordinates; 0457485 0042173.

The wetland (Plate 6) along Tuba road is quite big covering a width of about 60 m and length more than 100m. It is fed by Nalubaga stream crossing the wetland which eventually drains into Lake Victoria. Minimal human activity was noted in the wetland hence it is still fairly intact. Grazing of cattle was noted about 100m from the road side on the south western side. Some structures were

noted in the wetland (Plate 6a). Species richness was higher on the south western side of the wetland than on the North eastern side (Plate 6b). Species recorded included *Cyperus papyrus* which was frequent, *Neoboutonia macrocalyx, Cyperus dives, Cissampelos mucronata, Ricinus communis, Leersia hexandra, Coix lacryma-jobis, Eucalyptus* sp*, Mimosa pigra, Acanthus polystachyus,* and *Triumfetta macrophylla.* None of the species recorded in the wetland is of conservation concern. The habitat has been considered of medium value since most of it is quite intact.

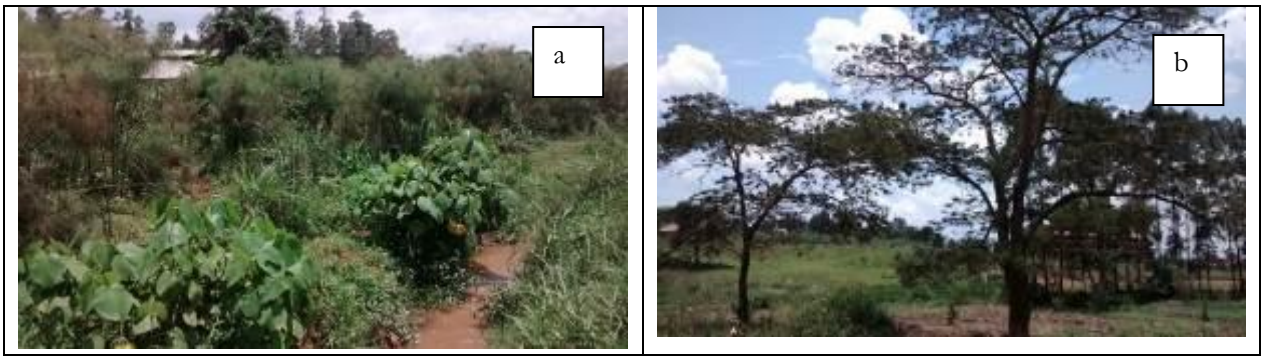


Plate 6: Wetland by Tuba road: (a) Roofed Structures in South Western side of wetland; (b) North eastern side of the wetland

The wetland along Kulambiro-Najeera Road is quite large covering a width of about 100m and length more than 100m.The stream (Nyanurade?) flowing across it is quite big (Plate 7a). It feeds into Nalubaga stream that eventually connects to Lake Victoria. The wetland is relatively degraded by anthropogenic activity such as growing of crops such as Bananas (matooke), maize, yams, sugarcane, cassava and on-going construction (Plate 7b). The North western side of the wetland is bigger and more intact than the South eastern side. Similarly species richness was higher on the North western side of the wetland than on the South eastern side. Plant species besides the mentioned crops observed in the wetland included *Tithonia diversifolia, Aframomum angustifolium* which was frequent, *Musa acuminaa Leersia hexandra, Cyperus dive*s which was frequent, *Ludwigia sp, Typha sp, Persicaria pulchra, Persicaria serrulata, Polygonum senegalense, zea mays, Coix lacryma-jobis, Melanthera scandens, Phoenix reclinata, Triumfetta macrophylla, Stephania abyssinica, Neoboutonia sp, Ricinus communis,Acanthus polystachyus* which was rare,*Solanum incanum, Mimosa pigra, Ipomoea rubens, Hibiscus cannabinus, Hibiscus rosa-sinensis, Melinis repens, Ficus sp, Ipomoea cairica, Amaranthus hybridus,* and *Urena lobata. Cynodon dactylon, panicum maximum, Hyparrhenia filipendula* were seen by the road side at the wetland area. None of the species recorded in the wetland is of conservation concern. The habitat has been considered of medium value since it is still quite intact.

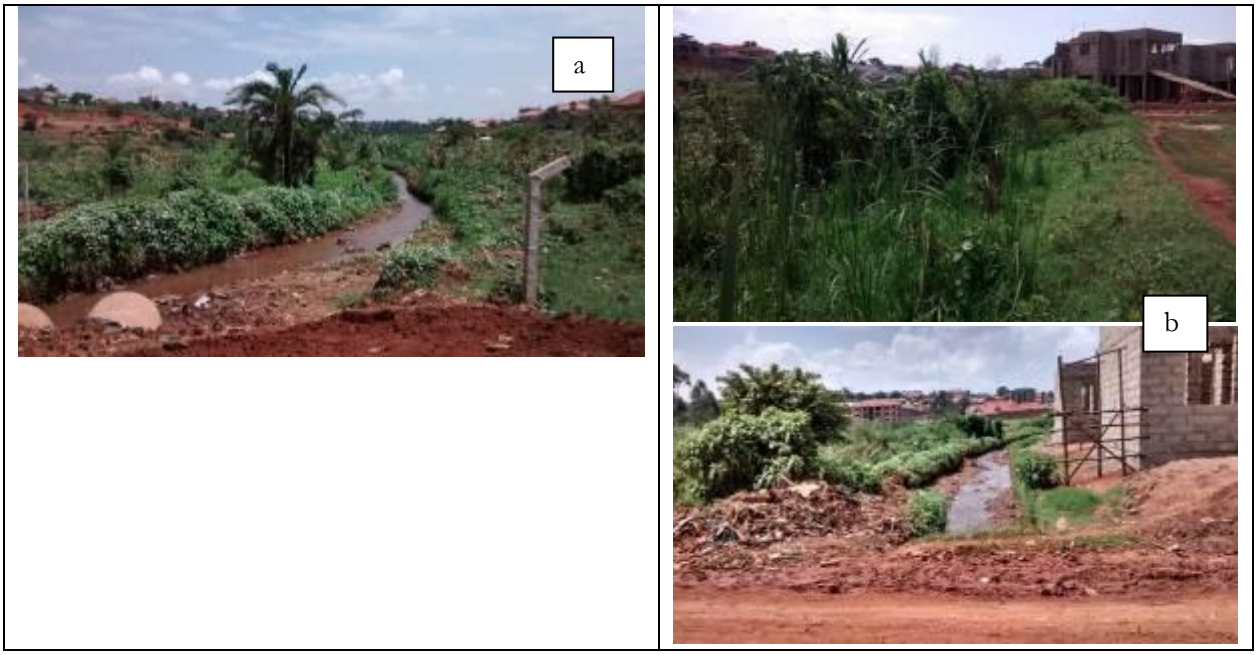


Plate 7: Wetland along Kulambiro-Najeera Road: (a) Stream within wetland on the North western side; (b) On-going construction on south eastern side of wetland

A total of 132 species distributed into 45 Families and 106 genera were recorded under cluster 3 roads. Most of the species recorded were herbs accounting for 52% as indicated in Figure 6 below.

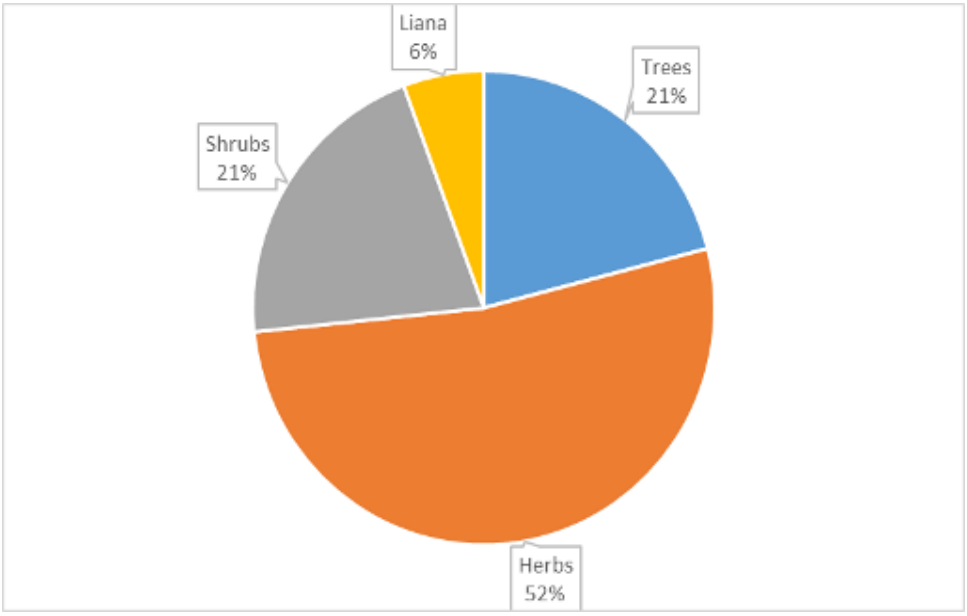


Figure 6: Distribution of plant species recorded under cluster 3 by life form

The full list of species recorded under cluster 3 is provided in Appendix XIIIc. The most common species recorded under cluster 3 were *Acanthus polystachyus, Ageratum Conyzoides, Amaranthus hybridus, Bidens pilosa, Cynodon dactylon, Ipomoea cairica, Stachytarpheta jamaicensis, Lantana camara, Leonotis nepetifolia, Mangifera indica, Manihot esculenta, Musa acuminata, Panicum maximum, Phoenix reclinata, Psidium guajava, Ricinus communis, Sida rhomboidea, Urena lobata* recorded on all the roads in the cluster. One species of conservation concern; *Juniperus procera* was recorded on the roads in cluster 3 (On Tuba road at UTM Arc 1960; 0456948E 0042824N). Fourteen known invasive species (Appendix XIIIc) were recorded including two major ones; *Lantana camara* recorded on all the three roads in the cluster and *Mimosa pigra* recorded on Tuba and Kulambiro-Najeera Roads.

Fauna

A total of 181 individuals from 31 species were recorded along the roads surveyed in cluster 3. Among these roads, Tuba road recorded the highest number of species (24) and individuals (104), followed by Kulambiro-Najeera road with 15 species and 46 individuals (Table 14). This cluster also had 7 C-species recorded including four forest generalists; the Lizard Buzzard, Little Greenbul, Blue-spotted Wood Dove and the Ross's Turaco, all recorded on Tuba Road (Appendix XIVc). Other C-species included an Afrotropical migrant, the White-throated Bee-eater recorded on Tuba road and the Palearctic Migrant: the Barn Swallow also on the same road. Some of the commonest species in this cluster include the Common Bulbul, Hadada Ibis and Black Kite.

The roads with the highest diversity of birds and high numbers of C-Species are those roads with suitable habitat (i.e with a diversity of trees, shrubs, fallow, wetlands and at times with some woodlots like in RU.12).

d. Cluster 4 (Nakawa-Ntinda road and its junctions; Naguru junction, Matyrs way junction and Ntinda T/C, Ntinda-Kisasi road, Bukoto-Ntinda road and its junction; Magambo Junction)

Flora

The sides of the roads above in cluster 4 were characterized by mainly vegetation in built up areas, followed by subsistence farmland, and then wetland vegetation cover types. Vegetation in built up areas was observed on all the roads in the cluster. It included shade, fence, ornamental, fruit, compound and road edge species. Subsistence farmland and wetland (stream) were observed on one road; Ntinda-kisaasi and Nakawa-Ntinda roads respectively.

The only ecologically sensitive site observed by the sides of roads in cluster 4 was the stream observed on both sides of Nakawa-Ntinda road at UTM Arc 1960 coordinates; 0457199 0038161. The stream joins Kinawataka stream that eventually joins Lake Victoria. The stream is still quite intact with minimal human encroachment. However on-going construction within proximity to the stream (Plate 8a) is likely to increase the turbidity of its water. Plant species (Plate 8b) observed by

and in the stream included *Echinochloa* sp which was dominant, *Commelina* sp which was also dominant, *Tithonia diversifolia, Ficus sur, Triumfetta macrophylla, Musa* sp, *Persicaria serrulata, Panicium maximum, Leersia hexandra, Coix lacryma-jobis, Enydra fluctuans, and Mimosa pudica*. None of the species recorded in the habitat is of conservation concern. The habitat has been considered of medium value since is still quite intact.

Plate 8: Stream by Nakawa –Ntinda road: (a) On-going construction by the stream; (b) Plant species by the stream

A total of 108 species distributed into 46 Families and 95 genera were recorded under the roads in cluster 4. Most of the species recorded were herbs accounting for 47% as indicated in Figure 7 below.

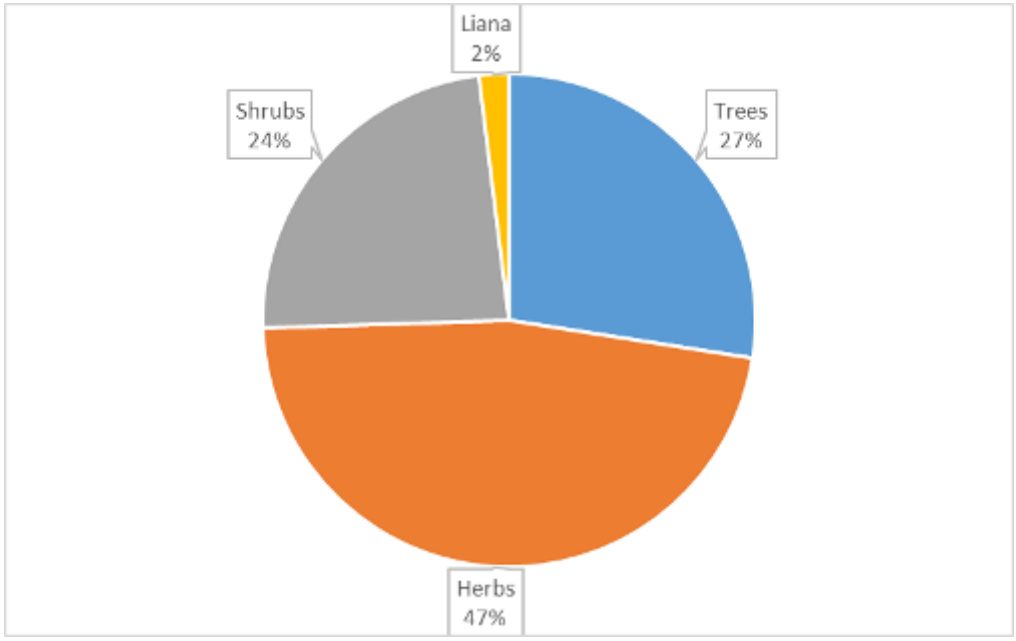


Figure 7: Distribution of plant species recorded under cluster 4 by Life form

The full list of species recorded under cluster 4 is provided in Appendix XIIId.The most common species recorded under cluster 4 were *Amaranthus hybridus, Sida rhomboidea, Artocarpus heterophyllus, Cynodon dactylon, Markhamia Lutea, Roystonea regia, Terminalia sp, Mangifera indica, Persea Americana, Thevetia peruviana* recorded on all the roads in the cluster.

Three species of conservation concern were recorded under the roads in cluster 4. These are *Canarium schweinfurthii* recorded on Ntinda Nakawa road (UTM Arc 1960; 0457105E 0037912N, 0457326E 0038628N), *Jacaranda mimosifolia* recorded on Ntinda Nakawa (UTM Arc 1960; 0457138E 0038022N, 0457338E 0038591N, 0457249E 0038817N) and Bukoto-Ntinda road and *Milicia excelsa* recorded on Ntinda Nakawa road (UTM Arc 1960; 0457160E 0039044N). *Milicia excelsa* is considered "near threatened" as per the IUCN red list. It is also listed on National Forestry Authority (NFA) 'Reserved Species List' as one of the species that needs protection from harvesting and any other form of destruction which would lead to decline in its abundance. Ten known invasive species (Appendix XIIId) were recorded including one major one; *Lantana camara* recorded on Ntinda-Kisaasi road.

Fauna

Altogether, 17species with 75 individuals were recorded under cluster 4 roads. Of the three roads, Ntinda-Kisaasi road (2C.10) had the highest number of species (10) and individuals (28) recorded, followed by the section on Kiira road (Bukoto-Ntinda) surveyed (2C.17) with 3 species and 13 individuals (Table 14). While in the associated junctions, 2A.14 - Martyrs way and 2A.21-Magambo junctions had the highest number of species each with 5 species and 10 individuals recorded (Table 13). Only one C-species was recorded in this cluster, the Black Kite around Ntinda Junction, Maytrs Way Junction, Nakawa Ntinda road (Appendix XIVd). The most common species in this cluster included the Pied Crow, Hadada Ibis, Cattle Egret and Black Kite.

Cluster 4 findings gives a good example of the importance of trees in increasing the diversity on birds in an area as evidenced by the very few numbers of birds recorded on the 2B.5- Nakawa-Ntinda road and associated Ntinda junction. The other roads and junctions in this cluster had many trees which supported high numbers of bird species and individuals. These trees provide a diversity of habitat suitable for the feeding, nesting and roosting of the bird species in this area and that is why many were recorded during the survey.

e. Cluster 5 (Naguru road, Katalima road and Lugogo bypass 2 junction)

Flora

The sides of the roads and junction above in cluster 5 were characterized by vegetation in built up areas. It included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the roads and junction in the cluster. A total of 42 species

distributed into 24 Families and 39 genera were recorded under cluster 5 roads and junction. Most of the species recorded were trees accounting for 60% as indicated in Figure 8 below.

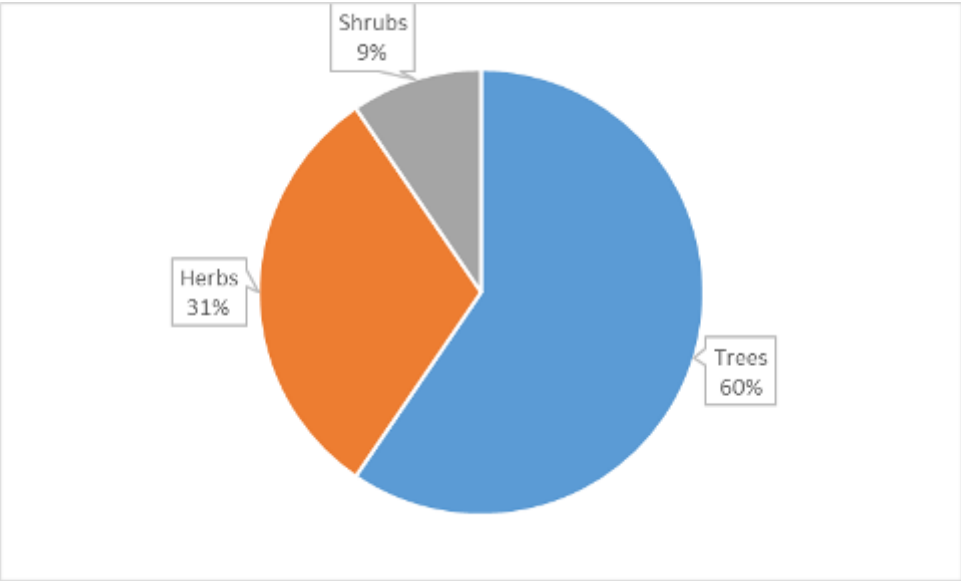


Figure 8: Distribution of plant species recorded under cluster 5 by life form

The full list of species recorded under cluster 5 is provided in Appendix XIIIe. The most common species recorded under cluster 5 were *Ficus benjamina, Jacaranda mimosifolia* and *Tabebuia rosea*recorded on all the roads and junction in the cluster.Three species of conservation concern were recorded under cluster 5. These are *Canarium schweinfurthii* recorded on Naguru road, *Jacaranda mimosifolia* recorded on all roads and the junction (UTM Arc 1960; 0455695E 0036794N) in the cluster and *Milicia excelsa* recorded on Naguru road. Three known invasive species (Appendix XIIIe) were recorded but none was major (pose a major threat to globally significant biodiversity). The invasive species recorded were *Cynodon dactylon, Bidens pilosa* and *commelina* sp.

Fauna

A total of 39 species and 144 individuals recorded for Cluster 5 roads and junction. Both of the roads in this cluster had high numbers of birds with 51 individuals and 9 species on Naguru road and 61 individuals and 7 species on Katalima road. Two C-species were recorded for cluster 5 and this was the Woodland Kingfisher, an intra-African Migrant recorded along Naguru road (Appendix XIVe) and the Splendid Starling a forest generalist recorded on Lugogo bypass 2. The commonest species in cluster 5 included the Cattle Egret, Red-eyed Dove and Hadada Ibis, all recorded in at least 3 sites. The habitat is mainly trees and many shrubs and undergrowth to support undercover bird species. That is why most of the species recorded here are those that prefer trees as habitat. The species that prefer the under storey and bushed habitat like the warblers were scarce with none recorded. This habitat could be improved by planting hedges along the roads after the renovations

to improve the diversity in the area. This could also bring in the pollinators like the bees and butterflies, which will be beneficial to the surrounding communities.

f. Cluster 6 (Ssezibwa road, and Acacia Avenue/John Babiha road)

Flora

The sides of the roads and junction above in cluster 5 were characterized by vegetation in built up areas observed on both roads in the cluster. It included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the roads in the cluster.

A total of 54 species distributed into 28 Families and 46 Genera were recorded under Cluster 6 Most of the species recorded were trees accounting for 43% as indicated in Figure 9 below.

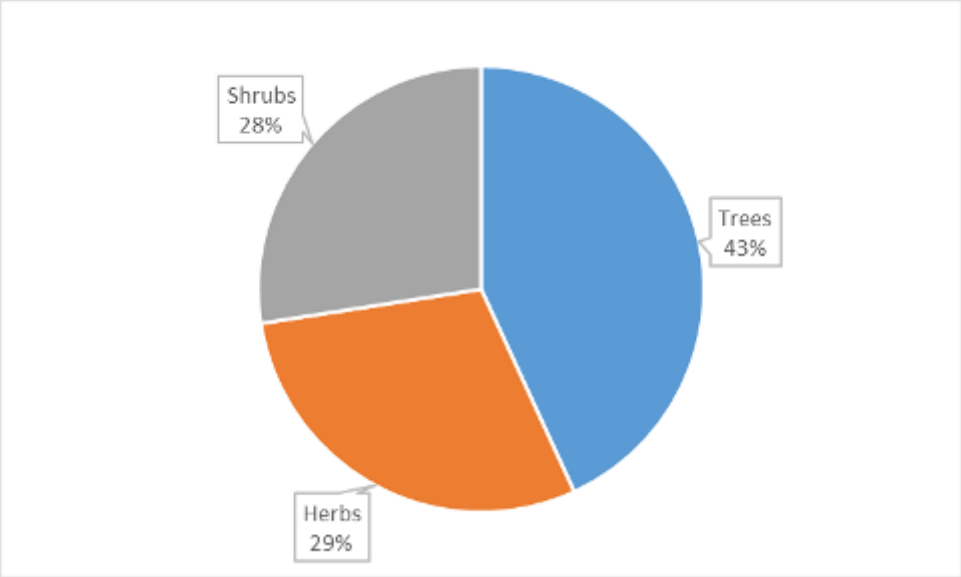


Figure 9: Distribution of plant species recorded under cluster 6 by life form

The full list of species recorded under cluster 6 is provided in Appendix XIIIf. The most common species recorded under cluster 6 were *Ficus benjamina, Jacaranda mimosifolia and Roystonea regia, Acalypha wilkesiana, Bougainvillea glabra, Duranta repens, Elaeis guineensis, Ficus* sp*, Grevillea robusta, Indigofera spicata, Panicum maximum, Pinus* sp*, Ravenala Madagascariensis, Sapium ellipticum, Senna siamea* recorded on both roads in the cluster.

Four species of conservation concern were recorded on the roads in cluster 6. These are *Canarium schweinfurthii* recorded on Ssezibwa road (UTM Arc 1960; 0453620E 0035635N), *Jacaranda mimosifolia* recorded on both roads (UTM Arc 1960; 0453698E 0035866N, 0453904E 0037617N, 0454053E 0037416N), *Khaya anthotheca* recorded on Acacia Avenue (UTM Arc 1960; 0453938E 0036232N) and *Podocarpus* sp recorded on Ssezibwa Road (UTM Arc 1960; 0453764E 0036076N, 0453752E 0036034N, 0453733E 0035963N). The existence of *Podocarpus* sp is not threatened as per the IUCN

Red list. However the species is listed on National Forestry Authority (NFA) 'Reserved Species List' as one of the species that needs protection from harvesting and any other form of destruction which would lead to decline in itsabundance. *Khaya anthotheca* is of global conservation concern being listed on the IUCN red list as Vulnerable. *Khaya anthotheca* is also listed on the NFA reserved species list.

Five known invasive species (Appendix XIIIf) were recorded under cluster 6 including one major one; *Lantana camara* recorded on Acacia Avenue.

Fauna

A total of 14 species and 70 individuals were recorded for Cluster 6 roads. Acacia road had a higher number of species (11) and individuals (51) given its diverse habitat type composed of many scattered trees and a woodlot near Biryani house as compared to Ssezibwa road with 7 species and 19 individuals and just a few trees recorded (Appendix XIVf). However, Ssezibwa road had two C-species recorded including the Afro-tropical Migrant the African Openbill Stork, and the Splendid Starling a forest generalist. In cluster 6, the Common Bulbul was the most common species recorded.

g. Cluster 7 (Portbell road and its junctions; Mbuya Barracks junction, Super oil Mutungo junction and Bank of Africa Luzira Junction, Spring road and its junctions; Tuskys Bugolobi Junction, MTN Bugolobi junction and Shell Bugolobi junction)

Flora

The sides of the roads above in cluster 7 were characterized by vegetation in mainly built up areas, followed by subsistence farmland, and then wetland and open water vegetation. Vegetation in built up areas was observed on all the roads and junctions in the cluster except Bank of Africa Luzira junction that hardly had any vegetation species. The built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. Subsistence farmland, wetland and open water vegetation was observed on only one of the roads namely Port bell.

The ecologically sensitive areas observed by the sides of roads and junctions in cluster 7 were the Lake Victoria, wetlands and streams observed along Port bell road at UTM Arc 1960 coordinates; 0461407E 003295N (stream1), 0451134E 0032774N (wetland 1), 0460980E 0032955N (Stream 2) at wetland 2. The part of Lake Victoria near the road is a pier, a busy site with boat operating activities. Stream 1 and 2 (Plate 9) at Port bell road were quite narrow and degraded with waste disposal.

Plate 9: Streams by Port bell Road: (a) Stream 1; (b) Stream 2

Wetland 1 was quite large more than 2 acres. It was on one side of the road that is, on southern side. The water flowing out of it flows into Lake Victoria. Species recorded in the wetland included *Cyperus papyrus* which was the dominant species, *Phragmites mauritianus, Persicaria serrulata, Canna indica, Musa sp, Echinochloa pyramidalis, Eycalyptus sp, Ficus sur, Ricinus communis,* and *Typha latifolia*. None of the species recorded was of conservation concern. Groups of Birds were in the wetland (Plate 10). The habitat has been considered of high value since it was still intact and habitat for biodiversity including the birds observed.

Plate 10: Wetland 1 by Portbell road

Wetland 2 (Plate 11) was quite big more than 2 acres. It was also on only the southern side of the road. It is degraded by human activity including growing of eucalyptus trees and crops including tomatoes, cassava, sugarcanes, maize, bananas and yams. Species recorded in the wetland besides the crops mentioned included *Ipomoea* sp, *Euphorbia Candelabrum, Phoenix reclinata and Phragmites mauritianus*. None of the species recorded was of conservation concern. The habitat has been considered of low value since considering its high level of degradation.

Plate 11: Wetland 2 by Portbell road

A total of 126 species distributed into 45 Families and 101 genera were recorded under cluster 7. Most of the species recorded were herbs accounting for 43% as indicated in Figure 10 below.

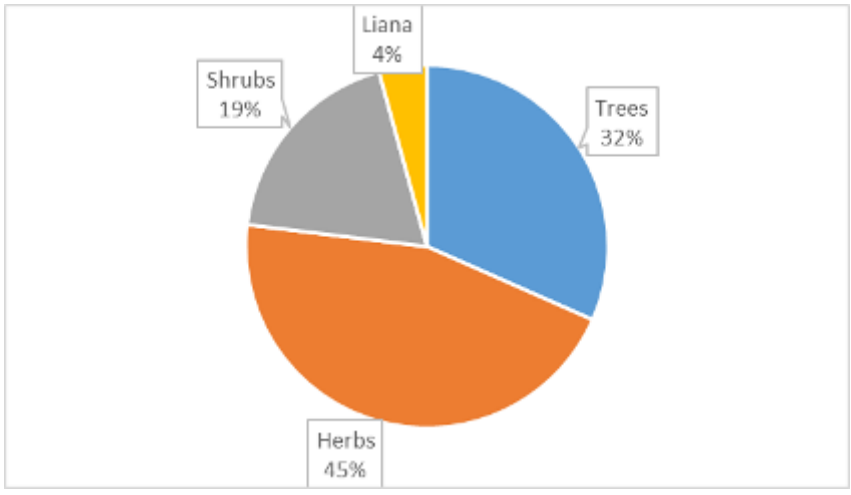


Figure 10: Distribution of Plant species recorded under cluster 7 by Life form

The full list of species recorded under cluster 7 is provided in Appendix XIIIg. The most common species recorded under cluster 7 were *Acalypha wilkesiana, Cynodon dactylon, Eragrotis tenuifolia, Eucalyptus* sp, *Ficus benjamina, Grevillea robusta, Jacaranda mimosifolia, Mangifera indica, Panicum maximum,*

Roystonea regia, Sapium ellipticum, Sida rhomboidea , Spathodea campanulata, Syzygium cumini, Terminalia catapa.

Four species of conservation concern were recorded on the roads in cluster 7. These are *Jacaranda mimosifolia* recorded on both roads in the cluster (UTM Arc 1960; 0457087E 0035754N, 0460809E 0033526N, 0459795E 0034428N, 0459742E 0034481N, 0459701E 0034525N, 0459661E 0034569N, 045881E 0035374N, 0458173E 0035654N, 0457993E 0035813N, 0457889E 0035897N, 0457633E 0036080N, 0457517E 0036149N), *Juniperus procera* (UTM Arc 1960; 0461359E 0032633N, 0461238E 0032711N, 0460861E 0033377N), *Maesopsis eminii* and *Podocarpus* sp (UTM Arc 1960; 0457808E 0035966N, 0457633E 0036080N) recorded on Portbell road. The existence of *Maesopsis eminii* is not threatened as per the IUCN Red list. However the species is listed on National Forestry Authority (NFA) 'Reserved Species List' as one of the species that needs protection from harvesting and any other form of destruction which would lead to decline in its abundance.

Eleven known invasive species (Appendix XIIIg) were recorded under cluster 7 including one major one; *Lantana camara* recorded on Port bell road.

Fauna

Of the two roads in cluster 7, Port bell road supported more birds as compared to Spring road with 22 species and 152 individuals compared to 12 species and 31 individuals respectively. This can be explained by the heterogeneous habitat along the Port bell road composed of many trees and a good spread of herbs and grasses with a wetland near the Bell factory, which supports many birds. The Spring Road on the contrary had a few Grevilea trees lining the road. If this habitat was improved to include some hedges, the diversity of birds would also generally increase in a way similar to that on the Port bell road (Appendix XIVg). On the junctions, Super Oil Mutungo, MTN Bugolobi and Bank of Africa junctions supported more birds as compared to other junctions. Among the species recorded were 8 C-species with seven recorded on Port bell road and one recorded on the Tuskys junction. Those recorded along Port bell road include four Afro-tropical migrants, one forest generalist, the Lizard Buzzard and two species with regional responsibility (R-RR), the Red0chested Sunbird and the White-headed Saw-wing.

h. Cluster 8 (5th Street, 6th street, 7th street and 8th street)

Flora

The sides of the roads and junction above in cluster 5 were characterized by vegetation in built up areas observed on all roads in the cluster. It included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the roads in the cluster.

A total of 79 species distributed into 31 Families and 61 genera were recorded under cluster 8. Most of the species recorded were herbs accounting for 49% as indicated in Figure 11 below.

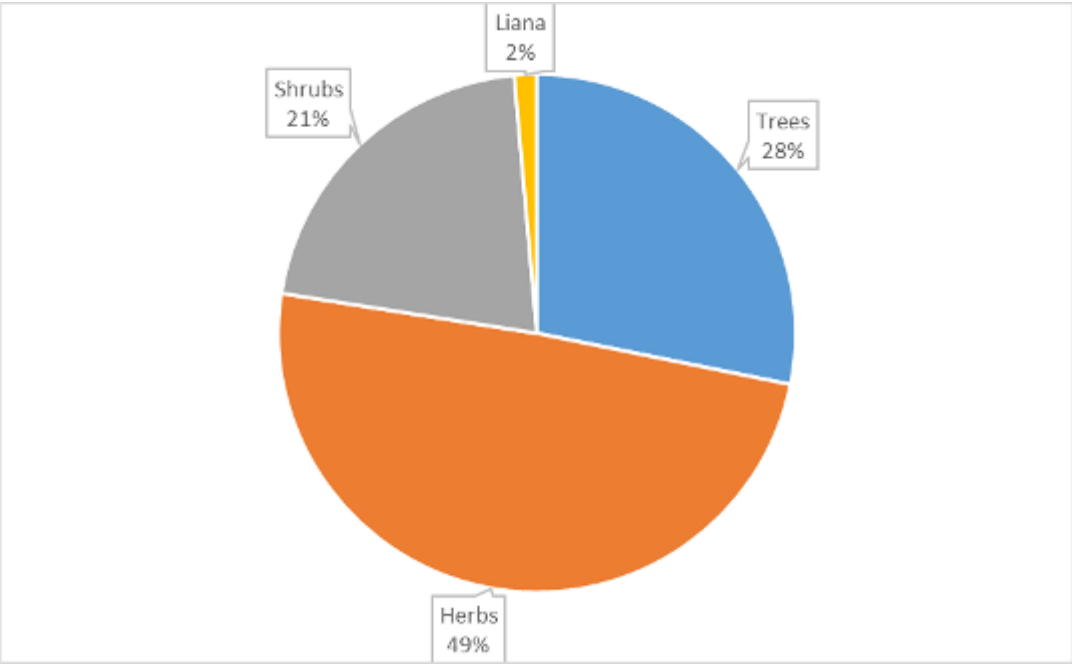


Figure 11: Distribution of Plant species recorded under cluster 8 by Life form

The full list of species recorded under cluster 8 is provided in Appendix XIIIh. The most common species recorded under cluster 8 were *Amaranthus hybridus, Eragrotis tenuifolia, Commelina* sp*, Duranta repens, Elaeis guineensis, Ficus benjamina, Ficus* sp*, Indigofera spicata, Mangifera indica, Oxalis corniculata, Pinus* sp*, Sida rhomboidea, Terminalia catapa*, recorded on more than 3 roads in the cluster. Two species of conservation concern were recorded on the roads in cluster 8. These are *Juniperus procera* recorded on 7th Street (UTM Arc 1960; 0456359E 0034955N) and *Jacaranda mimosifolia* recorded on 6th Street (UTM Arc 1960; 0455628E 0035370N, 0456250E 0456250 0035172N). Five known invasive species (Appendix XIIIh) were recorded under cluster 6 including one major one; *Lantana camara* recorded on 7th Street.

Fauna

Cluster 8 had four roads all in the highly built up industrial area (Table 14). Only 15 species and 109 individuals were recorded in this cluster, the majority being Marabou Stork and Pied Crow (Appendix XIVh). The eighth, seventh and sixth streets in the industrial area supported many birds, not because they had many trees but because they have tall buildings to support the favoured species. This type of landscape supports some species but excludes the important species in the Ecological food chain, which usually act as foods for the bigger species.

i. Cluster 9 (A109 road, Old Mubende road, Mugema road, Sentema road, Muteesa 1 road, Ndeeba junction, Kabuusu junctionand Bulange Junction)

Flora

The sides of the roads and junctions above in cluster 9 were characterized by mainly vegetation in built up areas, followed by subsistence farmland, and then wetland vegetation. Vegetation in built up areas was observed on all the roads and junctions in the cluster. The built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. Subsistence farmland was observed on all roads except Muteesa I while wetland was observed on only Mugema road.

The only ecologically sensitive site observed by the sides of roads in cluster 9 was the wetland on Mugema road at UTM Arc 1960 coordinates; 0447938 0035674.

The wetland on Mugema road is quite big covering about 150 m (width) and length of more than 100 m on both sides of the road. The stream (Nabisosiro) feeding it shown in Plate 12a connects to Lubigi swamp. The south eastern side of the wetland is relatively degraded by human activity including waste disposal and filling for construction purposes (Plate 12b). There is higher species richness on the north western side (Plate 12c) of the road than on the south eastern side.

Species recorded in the wetland included *Echinochloa pyramidalis* which was dominant, *Polygonum senegalense Cyperus distans, Triumfetta tomentosa, Cyperus dives, Cyperus papyrus* which was rare, *Coix lacryma-jobis, Persicaria serrulata, Leersia hexandra, Typha latifolia* which was dominant, *Aframomum angustifolium, Alchornea cordifolia, Mimosa pudica, Hibiscus diversifolius, Sorghum vulgare, Acanthus polystachyus, Pseudospondias microcarpa, Senna hirsuta, Phoenix reclinata* which was rare, *Hallea stipulosa, Ipomoea* sp,*Saccharum officinarum,Vernonia amygdalina, Musa* sp, *Amaranthus hybridus subsp Cruentus, Hallea rubrostipulata, Xanthosema sagittifolium, Ipomoea wightii, Ipomoea cairica, Solanum mauritianum, Pennisetum purpureum, Brachiaria Brizantha, Sorghum arundinaceum, Ricinus communis, Malvaviscus arboreus, Amaranthus spinosus, Lemna minor, Cissampelos mucronata, Stephania abyssinica, Centrosema pubescens, Panicum trichocladum, Achyranthes aspera,* and *Jussiea* sp. None of the species recorded in the wetland of conservation concern. The habitat has been considered of high value since it was still intact.

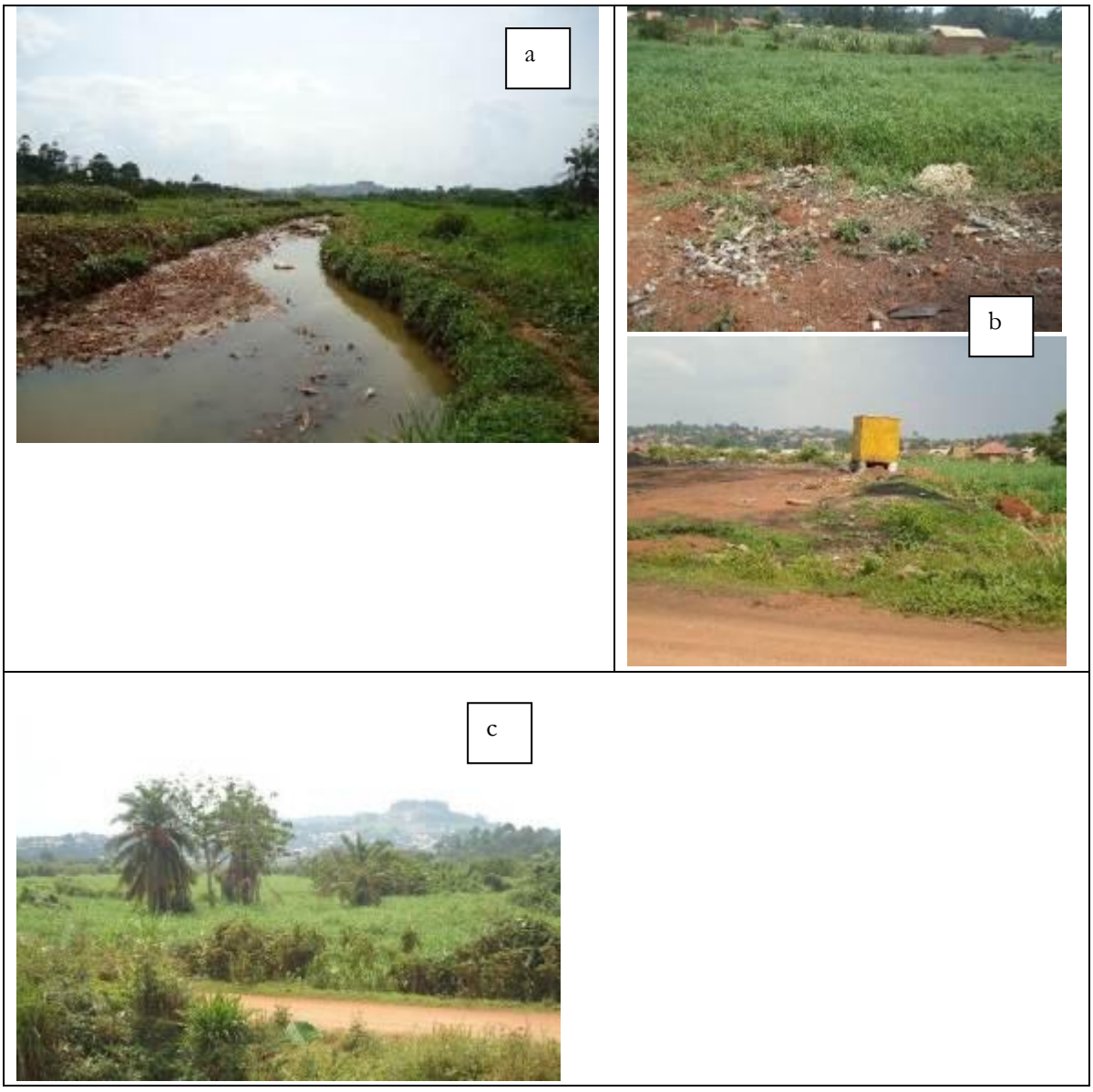


Plate 12: Wetland by Mugema Road: (a) Stream within wetland; (b) Waste disposal and filling in wetland; (c) North western side of wetland with higher species richness

A total of 165 species distributed into 49 Families and 118 genera were recorded under cluster 9. Most of the species recorded were herbs accounting for 50% as indicated in Figure 12 below.

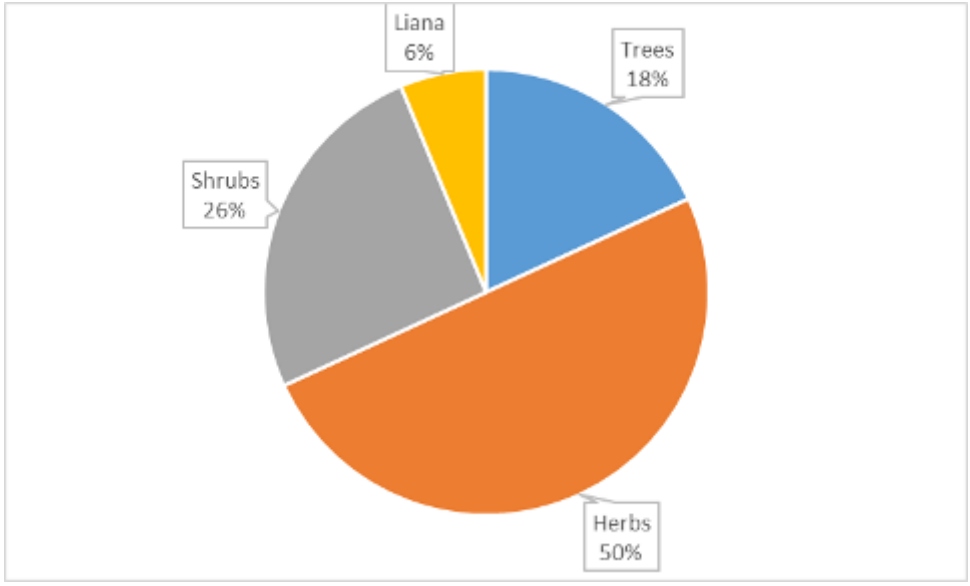


Figure 12: Distribution of Plant species recorded under cluster 9 by Life form

The full list of species recorded under cluster 8 is provided in Appendix XIIIi. The most common species recorded under cluster 9 were *Duranta repens, Sida rhomboidea, Bidens pilosa, Cynodon dactylon, Mangifera indica, Markhamia lutea, Solanum incanum, Ageratum conyzoides, Artocarpus heterophyllus, Canna indica, Eucalyptus sp, Ficus sp, Indigofera spicata, Ipomoea cairica, Leucaena leucocephala, Musa sp, Oxalis corniculata, Panicum maximum, Persea americana, Thevetia peruviana* which were recorded on more than 3 survey areas.

Seven species of conservation concern were recorded under cluster 9. These are *Brugmansia suaveolens* recorded on Old Mubende (UTM Arc 1960; 0447789E 0034850N), Mugema (UTM Arc 1960; 0447875E 0035678N), and Sentema Roads, *Hallea rubrostipulata* recorded on Mugema Road (UTM Arc 1960; 0447726E 0035603N), *Hallea stipulosa* recorded on Mugema Road (UTM Arc 1960; 0447726E 0035603N), *Jacaranda mimosifolia* recorded on Muteesa I Road(UTM Arc 1960; 0450464E 0035637N, 0450405E 0035377N), *Juniperus procera* recorded on Old mubende Road, *Maesopsis eminii* recorded on Mugema Road (UTM Arc 1960; 0447671E 0035566N) and *Tamarindus indica* recorded on A109 Road. *Hallea rubrostipulata* is listed on National Forestry Authority (NFA) 'Reserved Species List' as one of the species that needs protection from harvesting and any other form of destruction which would lead to decline in its abundance. *Hallea stipulosa* is both of national and global conservation concern. It is listed on the IUCN Red list as Vulnerable. It is also on the NFA"Reserved Species List". *Tamarindus indica* is listed on National Forestry Authority (NFA) 'Reserved Species List' as one of the species that needs protection from harvesting and any other form of destruction which would lead to decline in its abundance.

Twelve known invasive species (Appendix XIIIi) were recorded under cluster 9 including two major ones; *Lantana camara* recorded on Kabuusu Junction and *Mimosa pigra* recorded on Mugema road.

Fauna

Cluster 9 is composed of roads located in less built up areas with less settlements and abundant vegetation with trees and shrubs. It contains three junctions, Ndeeba Kabuusu and Bulange Junctions. A total of 36 species and 312 individuals were recorded in cluster 9 (Appendix XIVi). The Ndeeba junction supported more birds than the Kabuusu junction but with mainly species that like roosting on top of tall buildings like the Marabou stocks, Speckled Pigeons, Hadada Ibis and Pied Crows. These species are town habituated and may not be highly affected by the lack of trees in the area as long as there is food available especially from dumping sites. This is seen from the results given that the Ndeeba Junction had no trees recorded at the point station but still recorded these species.

Of the roads, RU.5 -Mugema road, RU.10 –Old Mubende road and RU.4- Muteesa I road supported more birds given the nature of the habitat in these sites, which composed of many trees, gardens, fallow and wetland sections on Mugema road, added to the abundant fallow with shrubs and thickets on Old Mubende road. Seven C-species were recorded in this cluster with 4 forest generalists; the Shikra, Long-crested Eagle, Ross's Turaco and Black & White Casqued Hornbill and African openbill stork recorded on Old Mubende, Mugema, Sentema, Muteesa I roads and Ndeeba Junction respectively. The common species in this cluster were the Cattle Egret, Black Kite, Common Bulbul and Pied Crow. The roads in this cluster seem to be important in the conservation of the bird species in the city given their heterogenous habitat which supports a number of C-species as above.

j. Sir Apollo Kaggwa road

Flora

The sides of Sir Apollo Kaggwa road were characterized by vegetation in built up area. It included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the road.

A total of 45 species distributed into 26 Families and 40 genera were recorded. Most of the species recorded were herbs accounting for 43% as indicated in Figure 13 below.

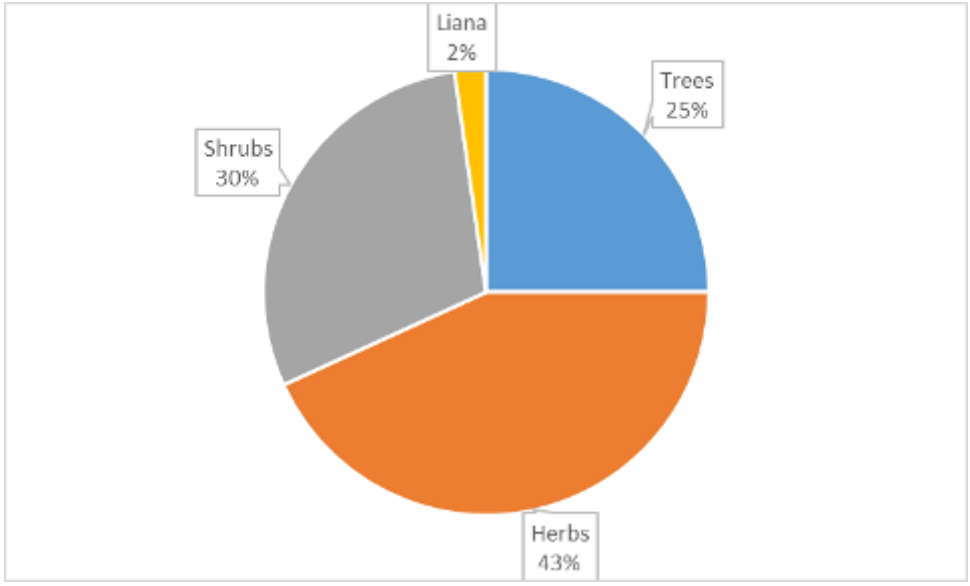


Figure 13: Distribution of plant species recorded along Sir Apollo Kaggwa road by Life form

The full list of species observed by Sir Apollo Kaggwa road is provided in Appendix XIIIj. One species of conservation concern; *Jacaranda mimosifolia* was recorded by the road at UTM Arc 1960; 045158E 0036169N). Three known invasive species (Appendix XIIIj) were recorded on the road but none was major. These were *Bidens pilosa, Agave sisalana* and *Cynodon dactylon.*

Fauna

A total of 11 species and 44 individuals were recorded (Appendix XIVj) on Sir Apollo Kaggwa road. One Afrotropical species, the Woodland Kingfisher was recorded on the road, which had a good number of tree habituated species like Laughing Dove and Scarlet-chested Sunbird recorded. This diversity of birds is supported by the good number of trees in the area including a woodlot recorded along the road. These habitat patches need to be avoided during the road improvements so as to maintain the state of the ecosystem and related biodiversity.

k. Namungoona road

Flora

The sides of Namungoona road were characterized by vegetation in built up areas and subsistence farmland vegetation. Built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the road.

A total of 30 species distributed into 21 Families and 27 genera were recorded under cluster 11. Most of the species recorded were herbs accounting for 42% as indicated in Figure 14 below. The full list of species recorded is provided in Appendix XIIIk. None of the species recorded is of conservation concern.

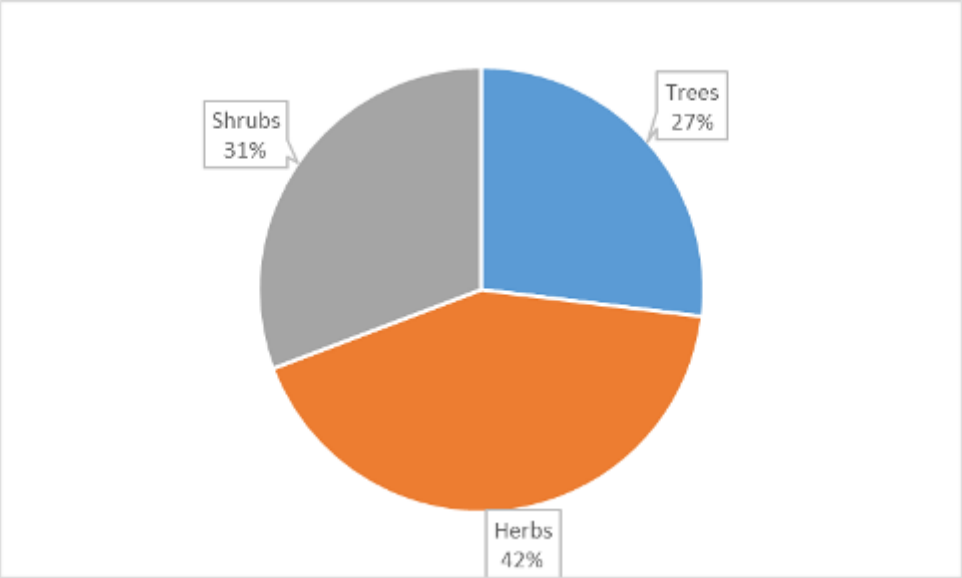


Figure 14: Distribution of plant species recorded along Namungoona road by life form

Three known invasive species (Appendix XIIIk) were recorded on the road but none was major. These were *Bidens pilosa, Commelina sp* and *Cynodon dactylon.*

Fauna

A total of 3 species and 97 individuals were recorded on Namungoona road. The road had some tree habituated species like Fork-tailed Drongo, Variable Sunbird and Laughing Dove (Appendix XIVk). Two C-species, were recorded in this cluster and both Afrotropical migrants recorded on Namungoona road. These were the Africa Openbill and White-throated Bee-eater. This road, being in a residential area, had a diverse habitat with a good number of trees, gardens and fallows which support a diversity of birds and that explains the birds recorded in this site.

l. Buwambo/Kitezi road

Flora

The sides of Buwambo/Kitezi road were characterized by vegetation in built up areas and subsistence farmland vegetation. Built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the road.

A total of 35 species distributed into 22 Families and 34 genera were recorded under cluster 12. Most of the species recorded were shrubs accounting for 37% as indicated in Figure 15 below.

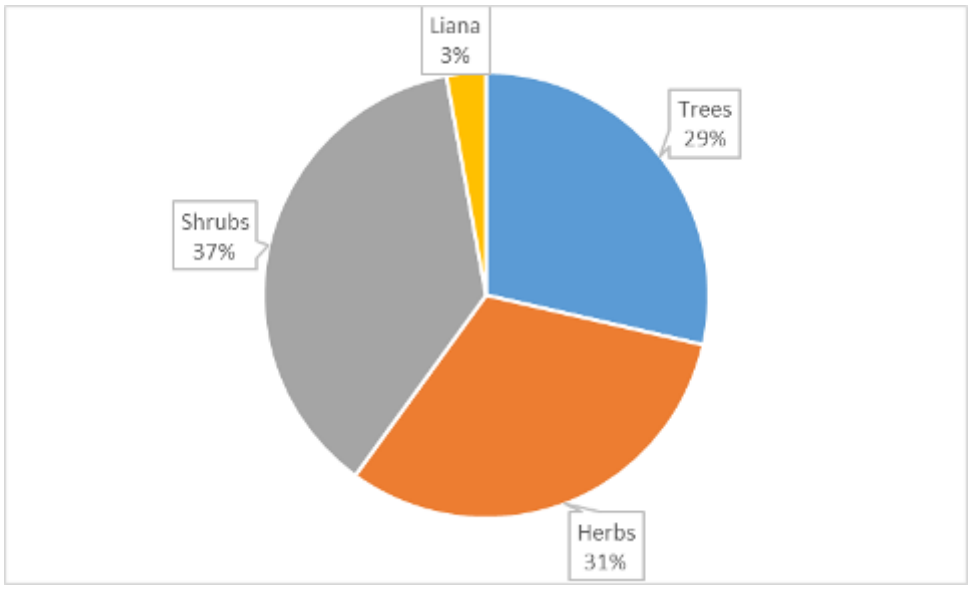


Figure 15: Distribution of Plant species recorded along Buwambo/Kitezi road by life form

The full list of species recorded under the cluster is provided in Appendix XIIIl. The most common species were *Cynodon dactylon* and *Markhamia lutea*. None of the species recorded is of conservation concern. Seven known invasive species (Appendix XIIIl) were recorded on the road but none was major. These were *Bidens pilosa, Cynodon dactylon, Eucalyptus* sp, *Leucaena leucocephala, Ricinus communis, Senna siamea and Solanum incanum.*

Fauna

A total of 12 species and 258 individuals were recorded on Buwambo/Kitezi road including 223 individuals of Marabou Stork (Appendix XIVl). No C-species was recorded except a partial migrant, the Black kite. This road is in a mixed setting with commercial centres and settlements and so exhibits a mixed habitat type with many trees interspersed with built up centres. This explained the diversity of species recorded along this road which included the commercially favoured species like the Black Kite, Speckled Pigeon and Pied Crow and those preferring trees and shrubby habitats like the Scarlet-chested Sunbird and Variable sunbird. The vicinity of Kiteezi dumping site to this site explains the large number of Marabou Storks recorded in this site. Being scavengers, they like feeding in dumping areas. The mixed type of habitats in this area favours a number of bird species.

m. Kyebando ring 2

Flora

The sides of Kyebando ring 2 road were characterized by vegetation in built up areas. Built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the road.

A total of 25 species distributed into 20 Families and 25 genera were recorded under cluster 13. Most of the species recorded were herbs accounting for 58% as indicated in Figure 16 below.

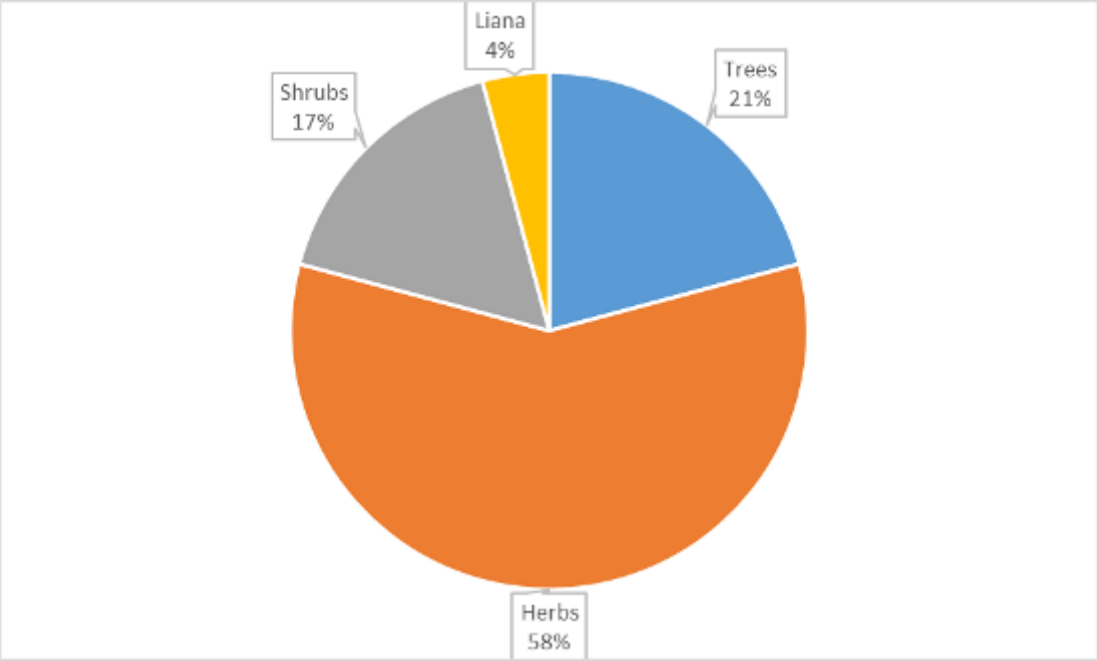


Figure 16: Distribution of Plant species recorded along Kyebando ring 2 by life form

The full list of species recorded under the cluster is provided in Appendix XIIIm. The most common species was Callistemon sp. One species of conservation concern, *Juniperus procera* was observed on the road at UTM Arc 1960; 0453641E 0040087N). Three invasive species were recorded on the road but none was major (Appendix XIIIm). These were *Bidens pilosa, Cynodon dactylon and Commelina* sp.

Fauna

A total of 12 species and 28 individuals were recorded on Kyebando ring 2 during the survey (Appendix XIVm). Among these species was one Afrotropical species, the Woodland Kingfisher. As in Cluster 12, this cluster also exhibited a mixed habitat type with medium vegetation cover interspersed with busy business centres with few trees. This explains the diversity of species recorded including the urban species like the Pied Crow and Speckled Pigeon and those preferring vegetated habitats like the Scarlet-chested Sunbird, Fork-tailed Drongo and Ruppell's Starling.

n. Luwafu road

Flora

The sides of Luwafu road were characterized by vegetation in built up areas and subsistence farmland vegetation. Built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the road.

A total of 31 species distributed into 22 Families and 31 genera were recorded under cluster 14. Most of the species recorded were herbs accounting for 47% as indicated in Figure 17 below.

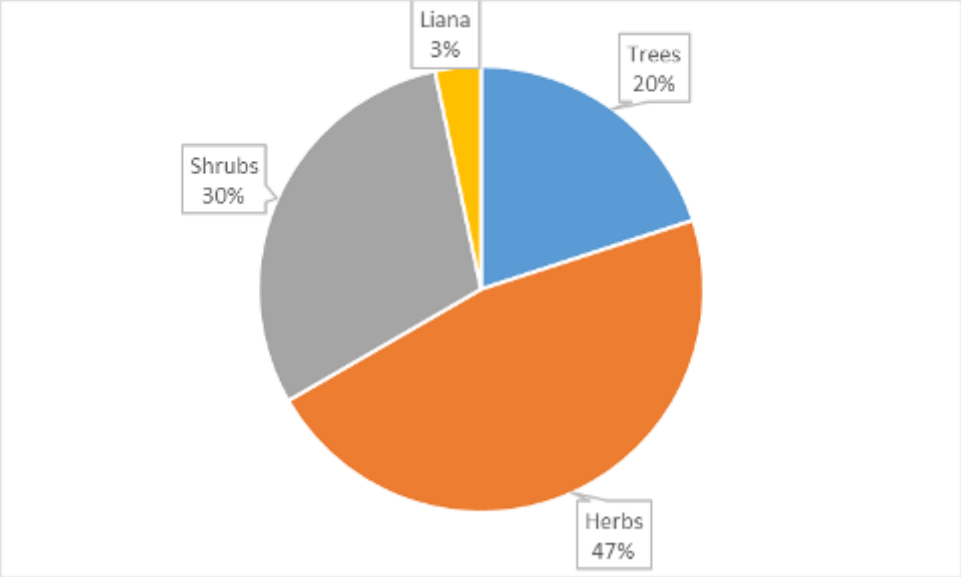


Figure 17: Distribution of Plant species recorded along Luwafu road by life form

The full list of species recorded under the cluster is provided in Appendix XIIIn. The most common species were *Sida rhomboidea, Mangifera indica,* and *Markhamia Lutea*. None of the species recorded is of conservation concern. Three invasive species were recorded on the road but none was major (Appendix XIIIn). These were *Bidens pilosa, Cynodon dactylon and Senna siamea.*

Fauna

A total of 9 species and 46 individuals were recorded on Luwafu road during the survey (Table 14). Among the species included were mainly species that prefer habitat with good trees and shrubs and not many urban birds were recorded. In addition, no C-species was recorded except for the partial migrant, the Black Kite. (Appendix XIVn). The most common species recorded were the Common Bulbul and Angola Swallow, which made up over 65% of all birds recorded in this site. The generally suitable habitat composed of trees, shrubs and bushes along this road can explain the diversity of birds recorded in this site. This habitat is suitable for a variety of birds which like roosting and feeding in diverse vegetation types.

o. Kisasi road 2

Flora

The sides of Kisasi road 2 road were characterized by vegetation in built up areas and subsistence farmland vegetation. Built up area vegetation included shade, fence, ornamental, fruit, compound and road edge species. No ecologically sensitive sites were noted along the road.

A total of 14 species distributed into 10 Families and 14 genera were recorded under the cluster. Most of the species recorded were herbs accounting for 69% as indicated in Figure 18 below. The full list of species recorded under the cluster is provided in Appendix XIIIo. None of the species recorded is of conservation concern. One invasive species was recorded on the road; *Lantana camara*, a major invasive species.

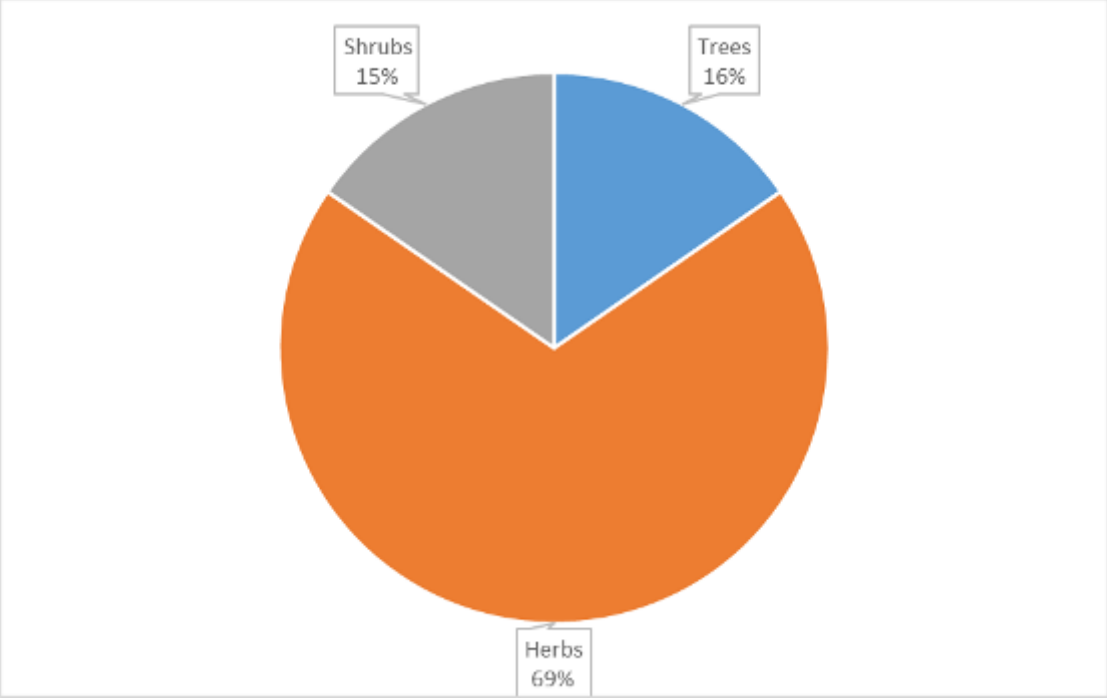


Figure 18: Distribution of Plant species along Kisasi road 2 by life form

Fauna

A total 14 species and 45 individuals were recorded on Kisaasi road 2. This is a good number of species on this road given its location in a mixed setting of settlements and business centres. One forest generalist, the Shikra is one of the species recorded in this site and the only C-species for the site. This shows the importance of this site in the conservation of such species. Among the species recorded are species that prefer good vegetated habitat like the Tawny-flanked Prinia, Yellow-fronted Canary, Bronze Mannikin, Scarlet-chested Sunbird, Variable Sunbird, African Blue-Flycatcher and Grey-backed Camaroptera (Appendix XIVo). These species like roosting and feeding

in heterogenous habitats as those on this road. The presence of the town centres with trees is an added advantage to species like the Feral Pigeon and Northern Grey-headed Sparrow recorded in this site.

p. Military Police Junction

Flora

The junction is characterized by vegetation in built up areas including ornamental, fence and road side species. No ecologically sensitive habitats were noted at the Junction area.

A total of 8 species distributed into 7 Families and 8 genera were recorded under the junction. Most of the species recorded were herbs accounting for 50% as indicated in Figure 19 below. The full list of species recorded is provided in appendix XIIIp. None of the species recorded is of conservation concern. One invasive species, *Cynodon dactylon,* was recorded at the junction.

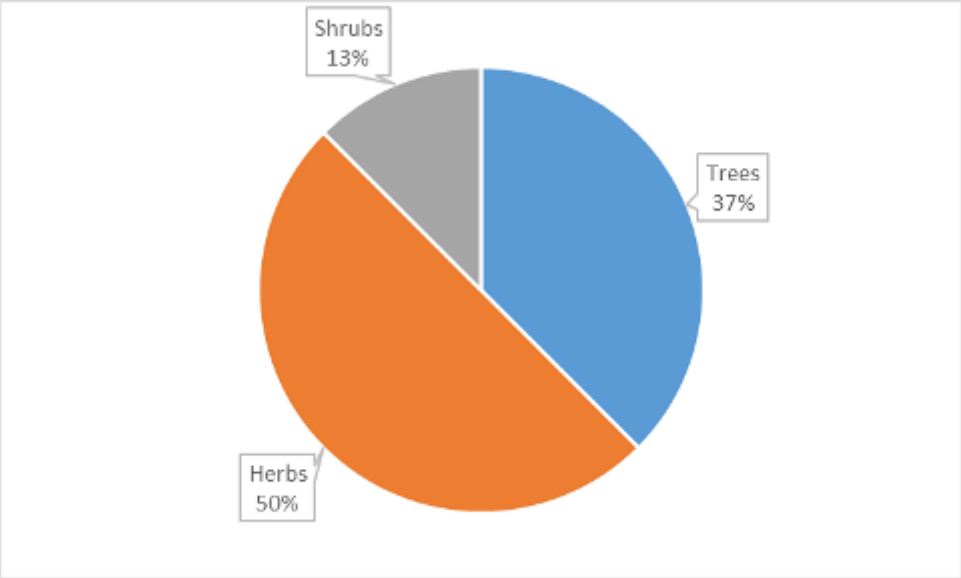


Figure 19: Distribution of Plant species recorded at Military Police junction by lifeform

Fauna

A total of 6 bird species and 26 individuals were recorded at Military Police Junction (Table 15, Appendix XIVp). None of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015.

Table 15: Number of Bird Species and Individuals recorded at the stand alone Junctions Surveyed

Junction	Junction name	Individuals	Species	C -Species
2A. 1	Hanlon-Nsambya	35	7	2
2A. 2	Military Police	26	6	0
2A. 3	Calendar rest-1	15	6	2
2A. 4	Namasole/ Busabala	13	3	0
2A.6	Lugogo bypass 1	14	5	1
2A.10	Kivebulaya	15	5	0
2A.13	Kabalagala	0	0	0

q. Calender rest 1 Junction

Flora

The junction is characterized by vegetation in built up areas including ornamental, fence and road side species. No ecologically sensitive habitats were at the junction area.

A total of 11 species distributed into 7 Families and 11 genera were recorded at the Junction. Most of the species recorded were herbs accounting for 70% as indicated in Figure 20 below. The full list of species recorded is provided in appendix XIIIq. None of the species recorded is of conservation concern. Two invasive species; *Cynodon dactylon* and *Leucaena leucocephala* were recorded at the junction.

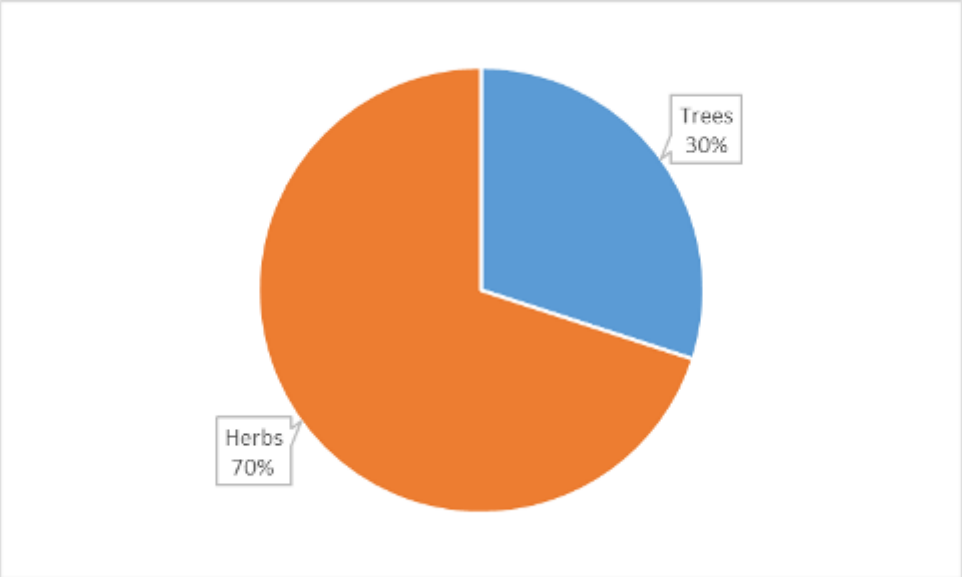


Figure 20: Distribution of Plant species recorded at Calendar rest junction by lifeform

Fauna

A total of 6 bird species and 15 individuals were recorded at Calender rest 1 Junction (Table 15, Appendix XIVp). Two of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015. These are the African Openbill Stork an Intra-African migrant and a Forest generalist the Splendid Glossy Starling.

r. Namasole/Busabala Junction

Flora

The junction is characterized by vegetation in built up areas including ornamental, fence and road side species. No ecologically sensitive habitats were at the junction area.

A total of 13 species distributed into 10 Families and 13 genera were recorded at the junction. Most of the species recorded were trees accounting for 42% as indicated in Figure 21 below. The full list of species recorded is provided in appendix XIIIr. None of the species recorded is of conservation concern. One invasive species; *Cynodon dactylon* was recorded at the junction.

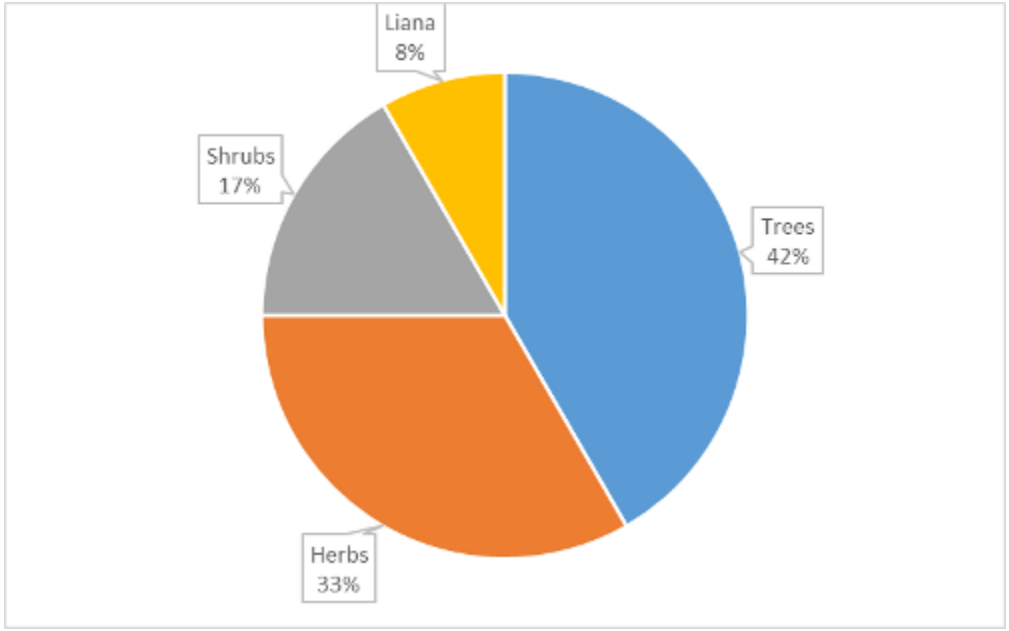


Figure 21: Distribution of Plant species recorded at Namasole/Busabala junction by lifeform

Fauna

A total of 3 bird species and 13 individuals were recorded at Namasole Busabala Junction (Table 15, Appendix XIVp). None of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015.

s. Hanlon-Nsambya Junction

Flora

The junction is characterized by vegetation in built up areas including ornamental, fruit, fence and road side species. No ecologically sensitive habitats were at the junction area. A total of 23 species distributed into 18 Families and 23 genera were recorded at the junction. Most of the species recorded were trees accounting for 50% as indicated in Figure 22 below.

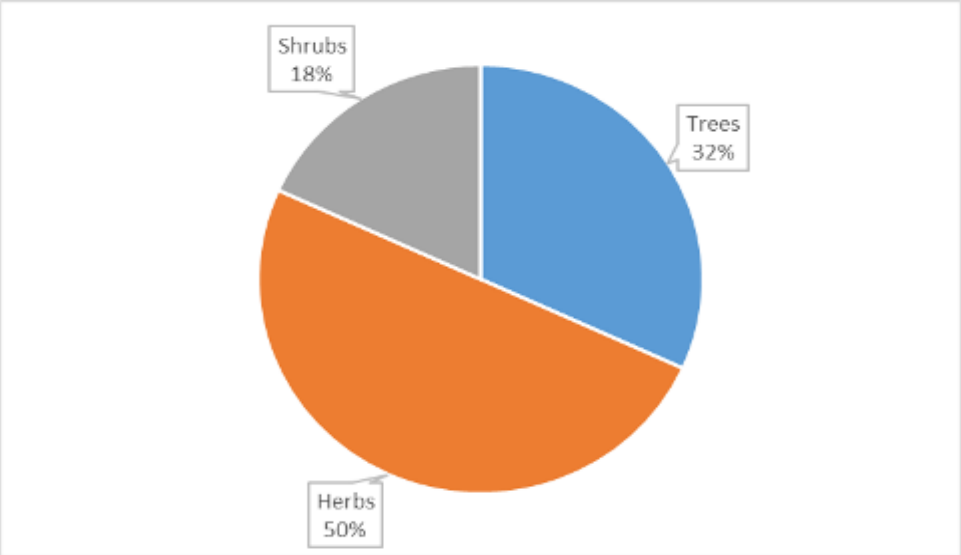


Figure 22: Distribution of Plant species recorded at Hanlon-Nsambya Junction by lifeform

The full list of species recorded is provided in appendix XIIIs. The most common species were *Sida rhomboidea and Amaranthus hybridus.* One species of Conservation concern; *Jacaranda mimosifolia* whose conservation status is mentioned above was recorded at the junction at UTM Arc 1960; 0454017E 0033565N. One invasive species; *Cynodon dactylon* was recorded at the junction.

Fauna

A total of 7 bird species and 35 individuals were recorded at Hanlon-Nsambya Junction (Table 15, Appendix XIVp). Two of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015. These are two Forest generalists; the Shikra recorded and the Splendid Glossy Starling recorded.

t. Lugogo bypass 1 Junction

Flora

The junction is characterized by vegetation in built up areas including ornamental, fence and road side species. No ecologically sensitive habitats were at the junction area.

A total of 26 species distributed into 19 Families and 24 genera were recorded. Most of the species recorded were trees accounting for 50% as indicated in Figure 23 below. The full list of species recorded is provided in appendix XIIIt.

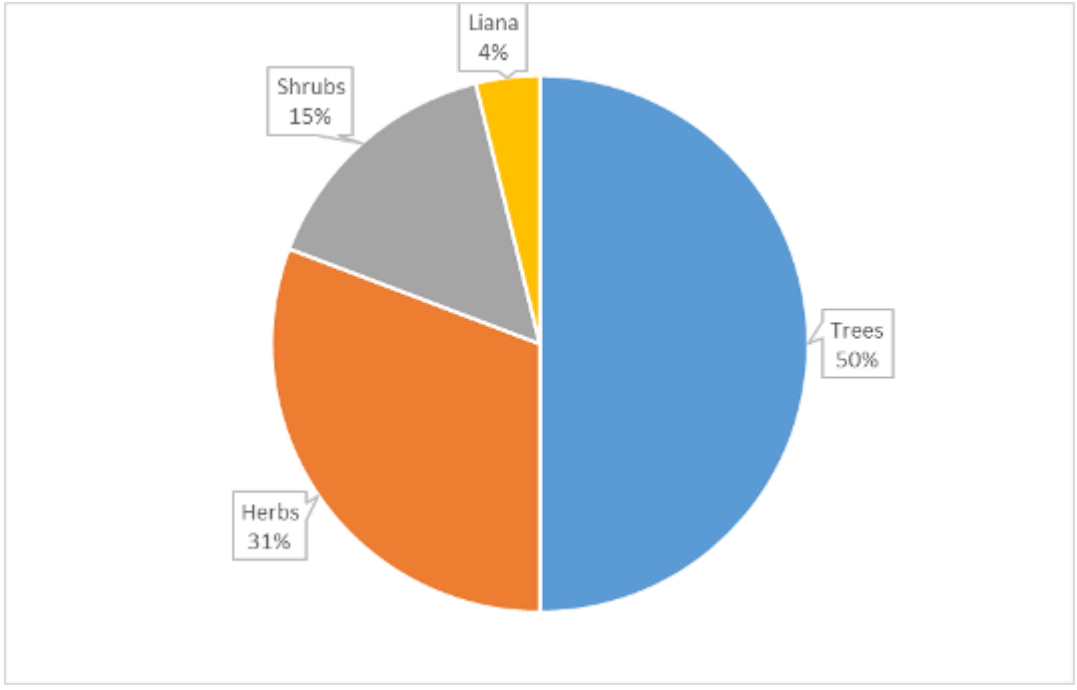


Figure 23: Distribution of Plant species recorded at Luggogo bypass 1 junction by lifeform

Three species of conservation concern were recorded at the junction. These are *Jacaranda mimosifolia, Khaya anthotheca* and *Juniperus procera.* The conservation status of the species is already mentioned above. Two invasive species were recorded at the junction, *Cynodon dactylon* and *Lantana camara*, a major invasive species.

Fauna

A total of 5 bird species and 14 individuals were recorded at Lugogo bypass 1 Junction (Table 15, Appendix XIVp). None of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015.

u. Kabalagala junction

Flora

Kabalagala junction is heavily built up with hardly any vegetation species. Only one plant species, *Roystonea regia* which is not of conservation concern (Appendix XIIIu) was observed by the junction area.

Fauna

No bird species were recorded at Kabalagala junction.

v. Kivebulaya Junction

Flora

The junction is characterized by vegetation in built up areas including ornamental, fence and road side species.

No ecologically sensitive habitats were at the junction area.

A total of 30 species distributed into 21 Families and 29 genera were recorded at the junction. Most of the species recorded were herbs accounting for 59% as indicated in Figure 24 below. The full list of species recorded is provided in appendix XIIIv. None of the species recorded is of conservation concern. Four invasive species; *Bidens pilosa, Commelina sp, Cynodon dactylon*and *Leucaena leucocephala* were recorded at the junction.

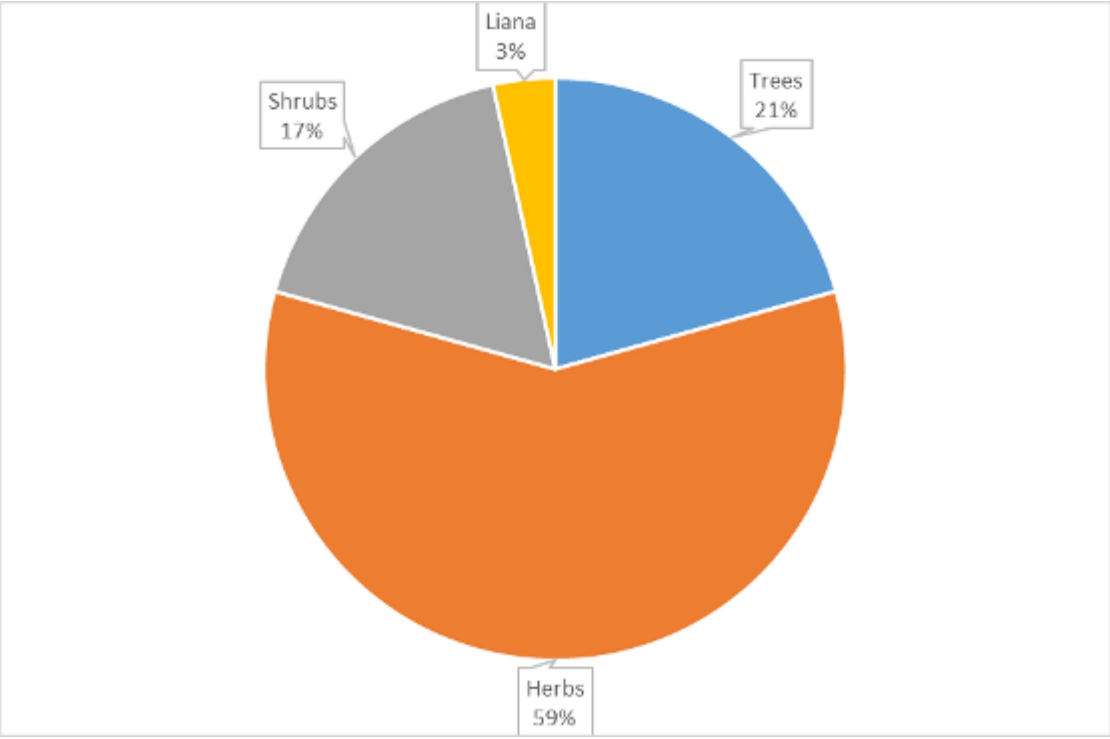


Figure 24: Distribution of Plant species recorded at Kivebulaya junction by lifeform

Fauna

A total of 5 bird species and 15 individuals were recorded at Kivebulaya Junction (Table 15, Appendix XIVp). None of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015.

w. Kawempe junction

Flora

Just like Kabalagala junction, Kawempe Junction is heavily built up with hardly any vegetation species. Three plant species; *Grevillea robusta, Sporobolus pyramidalis and Tectona grandis* were observed at the junction area (Appendix XIIIw). None of the species observed is of conservation concern.

Fauna

A total of 4 bird species and 8 individuals were recorded at Kawempe Junction (Table 15, Appendix XIVp). None of the species recorded were of conservation concern (C-Species) in accordance with IUCN 2015.

x. Tree coverage

The tree coverage by road/junction is summarized in Table 16 below.

Table 16 : Summary of tree coverage by Road/Junction

Road/Junction	Tree coverage by road/junction side
Hanlon Nsambya Junction	Low
Military Police Junction	Low
Calender rest-1 Junction	Low
Namasole/busabala Junction	Low
Kayemba Road	Low
Portbell Road	Medium
Spring Road	Low
Nakawa-Ntinda Road	Medium
Acacia Avenue	Low
Ntinda-Bukoto Road	Low
Sir Apollo Kagwa Road	Low
Sentema Road	Low
Lukuli Road	Low
Kabuusu-Kitebi Bunamwaya Road	Medium
Kulambiro Ring Road	Low
Namungoona Road	Low
Lugogo bypass 1 Junction	Low
Lugogo bypass2 junction	Low
Kawempe Junction	Low
Ndeeba Junction	Low
Kivebulaya Junction	Low
Kabuusu Junction	Low
Bulange Junction	Low
Kabalagala Junction	Low

A109 Road	Low
SSuna road-2	Medium
Sezibwa Road	Medium
Muzito Road	Low
Eighth street/ Namuwongo Road	Low
Luwafu Road	Low
Ntinda-Kisasi Road	Low
Buwambo-Kitezi Road	Medium
Naguru Road	Low
Katalima Road	Low
Sixth Street	Low
Seventh Street	Low
Fifth Street	Low
Kyebando Ring2	Low
Muteesa I Road	Medium
Mugema Road	Medium
Kabega Road	Low
Kirombe Road	Low
Kisasi Road 2	Low
Wamala Road	Low
Old Mubende	Low
Ssuna road-1	Low
Tuba Road	Low
Kulambiro-Najeera	Low

3.2.3 Socio-economic and cultural environment

3.2.3.1 Administrative framework

In 2010, the Government of Uganda (GoU) passed the Kampala Capital City Authority Act which established KCCA to administer Kampala on behalf of Central Government. The city's administrative structure as defined under the Act is comprised of Divisions. The divisions are subdivided into parishes and parishes are further subdivided into villages/zones being the lowest administrative units. The Divisions include: Central Division, Kawempe Division, Lubaga Division, Makindye Division and Nakawa Division. The Divisions are managed by both technical and political officials who oversee the day to day operations of all areas under their jurisdiction. On the technical side, the Divisions are headed by the Town Clerk and a popularly elected Mayor for the tehcinical wing.

Wakiso District like other districts in the country, is subdivided into Sub-Counties and is also managed by both technical and political leadership. The Chief Adminsitrative Officer (CAO) is the head of the technical wing while the LC 5 is the head of the political wing.

The proposed roads under the Second Kampala Institutional and Infrastructure Development Project are located in all the five divisions of Kampala City. However, a section of one of the roads i.e. Kabuusu-Kitebi-Bunamwaya is located in Wakiso District in Makindye Sabagabo Division.

According to UBOS information, the road links traverse 5 Divisions and more than 300 villages. There was however a challenge of confirming the names of the villages on ground as most people in Kampala neither know the parishes nor the names of the villages in which they reside. They identify their villages by the nearest known trading centre. It is expected that the villages will be confirmed during the preparation of the Resettlement Action Plan (RAP). Table 17 shows the administrative units through which the road links traverse. However, it should be noted that the list of parishes and villages is not exhaustive.

Table 17: Administrative Units per Road

	Road Name	Division	Parish	Village/Zone
	Old Port bell Road/ Spring Road	Nakawa	Industrial Area, Bugolobi, Luzira	Pepsi, Seventh Street, Zone VIII, Bungalows I, Zone VII, Zone V, Jambula, Kiyembe
	Portbell Road		Nakawa	Nakawa H, Nsimbwe Kasi, MUBS Zone VI, Zone IV, Zone III, Zone III, Buyinja, Zone 8, Kiyembe, Prison, Zone XI, Zone XII, Zone XIII, Zone 7, Zone IX, Zone X, Zone VII, Zone VI, Safina, Luzira Prison, Kisenyi I, Kisenyi II, Kisenyi III, Stage V Stage IV, Kasumba, Stage VI, Mambo, Bado, Kimwanyi, Railway Quarters
	Nakawa-Ntinda Road		Ntinda Police Barracks	Bbuye Central, Sempagala, Nsimbiziwome, Musalini, Village A, Mowlem, Sempijja, Old Kira Road, Brown Flats, Church Community Village, Village 11, Village 10, Village I, Village 12, Village 8, Village 6, Village 5, Village 4, EAC Flats, Ntinda Police Barracks, Village 7, Village 18, Village 14, Village 13, Village 17
	Ntinda-Kisasi		Bukoto II	Butikirwa, Sempagala, Village 10 Village 12, Bbuye Central, Bukenya Kalinabiri II
	Naguru road			Basketville, Hospital, Remand Home II, Naguru I, Nsimbwe Kasi, Ntinda Police Barracks
	Katalima road			Ntinda Police Barracks, Godown, Buyinja, Naguru I, Nsimbwe Kasi

	Road Name	Division	Parish	Village/Zone
	Bukoto-Ntinda road			
	John Babiha/ Accacia Avenue	Central	Kololo IV	Tufnell, Zone VI, Kitante Hill Zone IV, Zone I, Coral Cresent Golf Course, Katonga, Fairway Kitante Road, Windsor Crescent
	Sezibwa road			Kitante, Kafu, Fairway, Kyadondo,Standard, Katonga
	Sixth Street			Pepsi, Sixth Street, Industrial
	Seventh street			Sixth Street, Railway, Industrial, Seventh Street, Agip
	Fifth Street			Zone III, Seventh Street, Bungalows I Bungalows II
	Eight Street/ Namuwongo Road		Kibuli, Wabigalo Project and Kisugu	Agip, Wabigalo Project, Muwafu, Market, Church Upper, Lakeside, Kisugu Central, Kisugu South A, Namuwongo A, Namuwongo B and Muyenga A, Seventh Street, Agip, Green Hill, Masigidi, Sixth Street, Railway, Godown, Kasanvu
	Lukuli Road	Makindye	Makindye I, Lukuli, Buziga and Salaama	Nawanku, Masaku, Juuko, Barracks, Mubarak, Water Pump, Kizungu, Kintu, Zone 5, Kibalama, Upper Konge II, Upper Konge I, Mudde, Upper Buziga, Mulungu, Taawo Nsuwa, Nkere, Wanyana, St. Benedicto, Lusaka, Katimbo, Tyaba, Kanisa, Kalule, Lower Konge, Bruna Seruwajji, Kakande, Katuuso, Serwadda, Kiruddu, Mawanga, Upper Mawanga, Munyonyo
	Luwafu road		Luwafu	Wansaso, Kasumba, Masaku, Kavule, Lwanga, Kirundu, Kiyembe, Waswa, Madirisa, Kanisa, Diplomat, Sendagala, Bukejje, Abbas, Amazon Ndikutamadda, Kibira A, Nakinyuguzi Lower, Luwafu Kizungu, Sempa, Kizungu, Luvuma, Military Barracks
	Kabega road		Nsambya Central	Gogonya I and Gogonya II
	Kirombe road		Makindye I,	Tyaba Katimbo, Kirombe, Zone 5 And

	Road Name	Division	Parish	Village/Zone
			Luwafu, Nsambya Central	Gogonya II
	Kayemba		Kibuye I	Masaku, Waswa, Kavule
	Buwambo/Kitezi road	Kawempe	Mpererwe Sekanyonyi	Sekati, Kikubu, Mpererwe Sekanyonyi, Nakyesanja I, Namalere, Kabega Kayanga, Lubatu Kisingira, Bumbu Kiteezi, Lusanja
	Sir Apollo Kagwa		Makerere I, Kagugube, Old Kampala	Bbanda, Mukubira, Zone 2, Lumumba Hall, Mary Stuart Hall, Zone I, Kagugube, Kitamanyangamba, Kakato Ii, Kakajo I, Nsalo, Old Kampala III Old Kampala II, and Old Kampala IV
	Muteesa I Road			Susana, Katende, Senkatuuka, Kitara Church, Mengo Hospital, Mengo Town, Masiki, Kayiwa
	Mugema Road		Busega	Kitaka, Central B, Central A, Nabisasiro, and Lugala
	Sentema Road	Lubaga	Lungujja	Hamu Mukasa, Mengo Market, Makay, Bulange A, Lusaze, Lugala, Masanafu Bukuluki, Mengo Market, Masiki, Mengo Town
	Namungoona Road		Lubya	Nabulagala, Lubya, Namungona I And Namungona II
	Muzito Road			Busingiri Nyanama, and Namasuba Para
	Ssuna I	Lubaga		Kitebi, Kisigula, Nyanama Busingiri Nyanama, Stella, Namasuba Para
	Ssuna II			Nyanama, St. Anne Busingiri Nyanama, Kisingiri Kikumi, Namasuba Para, Nakinga, Lufuka, Zzana Market Kirimanya
	Wamala road			
	A109			
	Old Mubende			Natete Central, Kivumbi, Wakaliga A, Musoke
	Kigala			
	Lungujja			
	Kabuusu-Kitebi-	Lubaga,		Kabuusu, Kabawo, Nabunya

	Road Name	Division	Parish	Village/Zone
	Bunamwaya	Makindye Sabagabo		Sembule, Kitebi, Kisigula, Busingiri Nyanama, Kisingiri, Ngobe, Zone 4, Zone 5, Lweza, Naziiba Central, Bunamwaya Central, Katale Mayanja
	Kulambiro Ring	Nakawa		Butikirwa, Kondogoro, Kigoowa II, Kalinabiri II, Bukenya, Sempagala, Kasaana
	Kulambiro-Najeera			Kulambiro Central, Kakajjo, Najeera, Bulabira,
	Tuba road			Kulambiro, Tuba
	Kiira road			
	Kisaasi 2 road			Lutunda, Wampamba, Kanyanya Quarters, Kikaaya B Ddungu, Kikulu, Kanisa, Kisota Kasaana, Komamboga

Source: Uganda Bureau of Statistics, GIS Department

3.2.3.2 Population and Demographic Characteristics

According to the provisional results of the Housing and Population Census 2014, the population of Kampala by Division is as presented in Table 18 below.

Table 18: Population distribution and household size by Division in Kampala

Division	No. of Households	Average HH size	No. of Males	No. of Females	Total
Central Division	23,205	3.2	41,107	38,682	79,789
Kawempe Division	94,574	3.5	159,800	178,512	338,312
Lubaga Division	105,991	3.6	178,353	206,033	384,386
Makindye Division	110,224	3.5	188,537	206,739	395,276
Nakawa Division	84,793	3.6	154,841	163,606	318,447
Total	**418,787**	**3.5**	**722,638**	**793,572**	**1,516,210**

Source: UBOS November 2014 Revised Edition

Central Division is the least populated and this is attributed to the fact it is mainly a central business area with very few people using it as a residential area. Wakiso District has a population of 2,007,700 persons of which 952,781 are male and 1,054,919 are female. Makindye Sabagabo Sub County has a population of 284,067 persons of which 133,079 are male and 150,988 are female. It is the most populated among the rural sub-counties.

The findings from the census further reported Wakiso District to have the highest population followed by Kampala District in Uganda. The findings imply that the project is located in areas with the highest population in the country. The high population in the two districts is attributed to the rural-urban migration where people come to urban areas to look for opportunities that are non-existent in the rural areas.

The average household size is 3.5 and 3.9 for Kampala and Wakiso respectively which are both lower than the national average of 4.7. Results of the households survey carried out on all the proposed roads indicated that the average household size along all the roads was 5.5 persons.

The average age of household heads the proposed roads is 41 years. The majority (57.2%) of the interviewed household heads are within the age category of 26-45 years, 19.3% are in the age category of 46-55 years, 9.2% (56-65 years), 8.8% (18-25 years), and 5.5% are above 65 years. The findings show that many of the household heads are still within the productive age.

In regard to sex of the household head, the results from the survey showed that 71.7% were headed by males and 28.3% were headed by females.

As regards marital status of household heads along the proposed roads, the socioeconomic survey findings showed that the majority of the household heads (59.4%) were married, 17.9% were single, 9.8% cohabiting, 9% widowed and 3.8% divorced or separated.

3.2.3.3 Literacy

The Uganda National Housing Survey 2012/2013 report indicates that in Kampala, the literacy rate for persons aged 10 and above in the year 2012/2013 stood at 93% with males at 95% and females at 92%. The report further stratified Wakiso District under Central 1 and the literacy rate for this region stood at 81% with males at 86% and females at 77%. This shows a high literacy rate among the persons in Kampala and Wakiso District.

In general, the socioeconomic findings for households along the proposed road links are not much different from the above indicating that the majority of the persons along these roads attained high education levels as shown in Figure 25 below. The results show that women also attained high levels of education like their male counterparts. The results imply that there will be ease in communicating with the affected persons. The socioeconomic findings further indicated that 82.6% of the households along the project roads could read and write in the English language while 88.3% could read and write and in any local language.

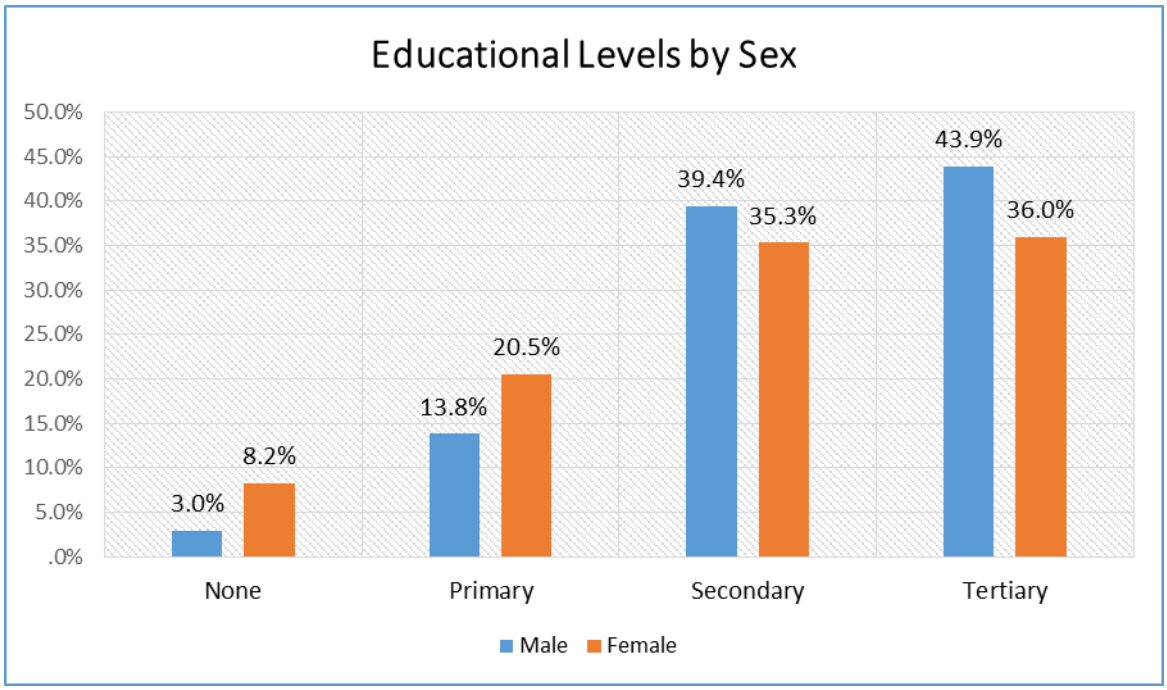


Figure 25: Education levels by sex of the household heads

3.2.3.4 Ethnic Composition

The proposed roads and junctions are located in Kampala the capital city of the country which is inhabited by ethnic groups from all over Uganda. There are also ethnic groups from other neighboring countries such as South Sudan, Kenya, Tanzania, Rwanda, Burundi and Democratic Republic of Congo among others. The project area is also inhabited by expatriates from other continents other than Africa. However, the most dominant tribe is the Baganda. The Luganda language is widely understood by most of the residents in the two project areas. Table 19 shows a summary of demographic characteristics of households by cluster.

Table 19: Demographic Characteristics of people per road/cluster of roads

Cluster / road	1	2	3	4	5	6	7	8	9	Sir Apollo Kaggwa road	Namungoona road	Buwambo-Kitezi road	Kyebando ring 2	Luwafu road	Kisasi road 2
Age group of Household head	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**%**	**(%)**	**(%)**
18-25	7.6	10.7	7.1	4.6	15.0		8.5	15.3	9.3	10.8	6.4	5.8	2.7	0	9.3
26-45	53.9	58.2	61.4	59.5	38.3	50	48.8	54.1	54.9	55.4	43.6	62.3	61.6	63.7	65.9
46-55	22.2	17.2	20.1	17.6	28.3	20.0	17.1	16.3	19.3	10.8	30.0	17.4	26	31.8	13.5
56-65	9.1	8.6	8.7	9.2	13.3	20.0	15.9	7.1	9.5	15.4	11.8	11.6	6.8	4.5	6.3
65+	7.2	5.4	2.7	9.1	4.2	10.0	6.1	7.1	7.0	7.7	7.3	2.9	2.7	0	4.8
Educational level															
None	7.4	4.9	3.2	1.3	4.2		3.7		4.6	1.5	2.7	1.4	2.7	4.5	2.4
Primary education	17.7	17.5	18.9	11	8.3	5	9.8	5	17.5	13.8	10.9	18.8	15.1	9.1	11.9
Secondary	43.4	17	35.1	30.5	42.5	30	26.8	30	36.6	38.5	51.8	40.6	38.4	36.4	42.1
Tertiary/Vocational	31.5	60.7	42.8	57.2	45	65	59.8	65	41.4	46.2	34.5	39.1	43.8	50	43.6
Sex of the household head															
Male	69	71.6	76.0	72.7	75	90.5	69.5	78.6	72.7	66.2	60.6	75.4	82.2	68.2	67.2
Female	31	28.4	24.0	27.3	25	9.5	30.5	21.4	27.	33.8	39.4	24.6	17.8	31.8	32.8

Cluster / road	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Sir Apollo Kaggwa road**	**Namungoona road**	**Buwambo-Kitezi road**	**Kyebando ring 2**	**Luwafu road**	**Kisasi road 2**
									3						
Marital status															
Single	18.6	23.9	15.3	15.0	60.5	57.1	65.9	27.6	16.2	20.0	11.8	10.1	11.1	9.1	16.7
Married	65.4	66.2	74.8	66	18.5	4.8	25.6	67.3	69.4	55.4	64.5	79.7	79.2	77.3	65.1
Cohabiting	10.3	12.3	4.9	9.8	5.0	4.8	3.7	8.2	11.1	10.8	7.3	5.8	5.6	18.2	3.2
Widowed	10.7	8.0	5.5	13.1	3.4	4.8	1.2	4.1	10.5	12.3	10.0	8.7	5.6	4.5	11.1
Divorced/Separated	5.3	1.9	4.4	5.9	12.6	28.6	3.7	1.0	3.9	1.5	6.4	1.4	4.2	9.1	4.0

3.2.3.5 Land Use and Land Tenure

a. Land use

The principle land use in Kampala and Wakiso Districts and along the project roads is mainly settlements both residential and commercial with small scale agriculture. Small-scale agriculture is widely distributed in exiting residential areas as well as periphery areas, which may not have been transformed into other uses. Similarly, land along all the project roads is mainly used for settlements both residential and commercial. Agricultural land use is very limited.

There are however some roads where land is mostly for industrial and commercial purposes such as Acacia road, Sezibwa road, 5th Street, 6th Street and 7th Street, Kibuye-Nateete-Busega road.

b. Land tenure system

Land ownership in Kampala and Wakiso Districts is under mailo, leasehold, freehold and customary tenure systems (MoLHUD & UNDP 2008). These are four tenure system through which land can be held in Uganda and is stipulated in article 237 of the 1995 constitution of Uganda. Kampala City Council Development Plan (2009 - 2011), indicated that 75% of the land in Kampala is categorized as mailo, 15% as leasehold, 7% Kabaka's land and 3% as freehold land.

The socioeconomic findings indicated that majority (69%) of the households owned titled land with a sizeable number (30%) owning land under kibanja system. Out of the interviewed households, 0.1% claimed to own land under customary and communal systems.

Most of the proposed roads are under Kabaka's land e.g. Kabuusu-Kitebi-Bunamwaya, Ssuna I & 2, Muzito, Wamala, Lukuli, Kabega, Kayemba, Kirombe, Namungoona, Muteesa I, Mugema, Lungujja, Old Mubende road, etc. Leasehold tenure was noted to be common along Portbell road, Spring road, Acacia, Ssezibwa road. Other roads are however, a mixture of all the tenure systems. The above implies in regard to compensation, along some roads, more than 1 person may have rights on the same piece of land.
In terms of size of land owned, most people own small plots of land of 50ft x 100ft. However, along some roads like Acacia, Namungoona, average size of plots owned is 0.25acres.

3.2.3.6 Economic Activities, Income Sources and Employment

a. Economic activities

The 2002 Uganda population and housing census reported that majority of the people in Kampala district 64.2% are engaged in employment, 19.4% trading in non-agricultural products, 9.3% trading in agricultural produce, 1.7% in animal rearing, 1.0% in fishing, 0.1% in crop farming and 4.2% in other in activities.

During field visits, it was observed that the population within and around Kampala is actively involved in various economic activities for their day to day survival. Economic activities majorly include trade in items such as food stuffs, furniture, construction materials, clothes and shoes and all sorts of merchandise.

Quite a number of markets were observed along some of the proposed roads. There were about 14 big markets identified along the different roads as shown in Table 20 below. Some of the markets were noted to be close to the road such as Bunamwaya market, Kibuye market, Kitintale market, Kayemba market while others were a bit far e.g. Ntinda Market and Bugolobi market. The RAP study will however determine whether these markets are operating within or outside the proposed road reserve. Some of the markets are legally recognized by KCCA while others, the status was not confirmed. Legally recognized markets include Bugolobi market, Kitintale market, Luzira market, Kayemba Market, Kibuye market, Nalukolongo market. Information on the numbers of vendors per market was scanty.

In addition, sale of grocery items in small kiosks was noted on roads outside Kampala Business Centre. In the event that these markets are within the road reserve, ample notice of 3-6 months or as per the legislation will be given to the affected persons.

Table 20: Markets identified along the project roads

Cluster	Name of road with market	Name of Market	No. of markets	No. of vendors
1	Kabuusu-Kitebi-Bunamwaya	Star Market, Bunamwaya Market	2	
2	Kayemba road	Kayemba Market	2	
3		No major market on any of the roads in cluster 3		
4	Nakawa-Ntinda road Ntinda-Kisaasi road	Ntinda Market Kisaasi market	2	
5	Katalima road Naguru road	Nakawa Market	1	6,000
6		No major market		
7	Old Portbell road New Portbell road	Bugolobi market Kitintale market Luzira market	3	
8	8th Street	Namuwongo market	1	200
9	Kibuye-Nateete-Busega	Kibuye market Nalukolongo market	2	
	Sir Apollo Kaggwa	No major market		

	road			
	Namungoona road	No major market		
	Buwambo-Kitezi road	No major market		
	Kyebando ring 2	No major market		
	Luwafu road	Luwafu market	1	
	Kisasi road 2	No major market		

In addition, service provision is very common on all roads in the form of bars, restaurants, salons/barber shops, education etc. Along Acacia and Sezibwa roads, services in the areas of education, sports, recreation, radio-TV/print media, health and fitness, private consultancy, marketing and banking etc. were noted.

There is also planting and sale of tree and flower seedlings in some areas around the project roads and junctions. This was mainly noticed along at the beginning of Katalima road, along Kibuye-Nateete-Busega roads towards the Kabuusu junction and along Naguru road towards Lugogo by-pass junction.

Another prominent economic activity is within the transport sector which involves taxi and motorcycle transport (boda boda). There were taxi and boda stages noted along the majority of the roads. Some of the stages are recognized by KCCA while others are not. However, on some roads like Acacia and Sezibwa, these stages were not observed. The presence of bodabodas along the different stages implies that KCCA and the Contractor will have to give ample notice to the operators to give way for the construction activities and also provide them with alternative parking/stages where possible.

Artisanal related activities such welding and carpentry etc were very common on the majority of the roads. Metallic windows, doors, gates etc. were displayed along different sections of the different roads.

In regard to farming, limited farming activities were observed on various roads. This is mainly attributed to the small pieces of land that are not suitable for commercial or even subsistence farming.

Results from the socioeconomic household survey also indicated that the majority of the households along the project roads (39.3%) are in formal employment, 39.6% are in trading in various items. The rest get income from boda boda riding, taxi/special hire driving, artisanal skills (welding, carpentry, tailoring etc), farming, casual labour, and remittances from rentals, family or pension. Figure 26 shows the main source of income for households along the project roads.

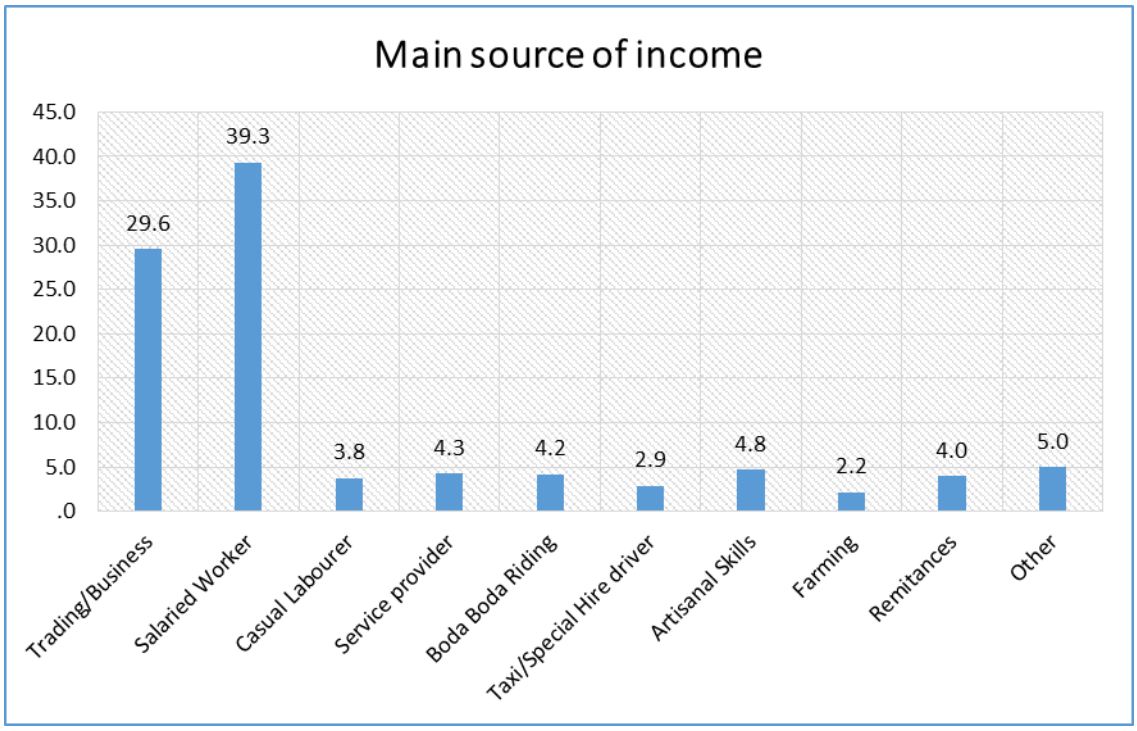


Figure 26: Main source of income for households along the project roads

b. Employment

Uganda National Household Survey (UNHS) 2009/2010 conducted by Uganda Bureau of Statistics (UBOS) revealed that unemployment rate in the country was at 3.0% and 5.2% among the males and females respectively. The study further revealed that unemployment rate was highest in urban areas (9.5%) and lowest in rural areas (3.0%). According to regions, unemployment rate was highest in Kampala at 11.4%.

The National Household Survey 2012/13 report indicates that 65% of Kampala's working-age population is employed accounting for 6% of the national employed population.
On the other hand, Labour Force Participation which measures the proportion of the country's population that engages actively in economic activities (those employed and those actively looking for work) indicated that Kampala was leading the country with 72 % of all national labour force participation happening within Kampala.

In Kampala district, majority of the people are either directly employed in organizations or are self-employed. These organizations range from business conglomerates, construction, financial, energy, food and beverage, manufacturing, foreign exchange bureaus, hotels, mass media, telecommunication, transportation and consultancy among others. Organizations that have provided employment opportunities for people in Kampala include: Steel and Tube Industries, Kampala Pharmaceuticals Industries 1996 Ltd, Megha Industries Uganda Limited, Quality Chemicals Industries Ltd, Hwan Sung Industries Limited, Picfare Industries Limited, Makss Packaging

Industries Limited, Crest Foam Ltd, Mukwano Group of Companies, BAT Uganda Limited, Banks such as ABC Bank (Uganda), Bank of Africa (Uganda), Bank of Baroda (Uganda), Barclays Bank (Uganda), Cairo International Bank, Centenary Bank, Crane Bank, DFCU Bank, Diamond Trust Bank (Uganda) Limited, Equity Bank (Uganda), Finance Trust Bank etc.

c. Income Levels

For households and individuals, income refers to "all the wages, salaries, profits, interest payments, rents and other forms of earnings received in a given period of time" (Case and Fair, 2007). In that regard, income is one of the monetary dimensions of measuring wellbeing of households and individuals. According to the Uganda National Housing Survey 2012/2013 report, Kampala had the largest share of monthly incomes above 500,000/= (47%). Table 21 illustrates the distribution of monthly incomes (classes) within Kampala and the Central region households.

Table 21: Income classes within Kampala and Centrla Region

Area	Low income Class			Middle income class		High income class	
	Up to 50,000/=	50,000/= - 100,000/=	100,000/= - 200,000/=	200,000/- 300,000	300,000/=- 500,000/=	500,000/= - 1,000,000/=	1,000,000/= and above
Kampala	2.1%	2.9%	11.2%	11.6%	24.9%	23.9%	23.5%
Central	4.0%	6.5%	20.6%	15.3%	19.5%	20.3%	13.8%

Source: Uganda National Housing Survey 2012/2013

The sources of income include subsistence farming, wage/salaried employment, transfers/remittances, commercial urban farming, non-agricultural enterprises and rent among others.

3.2.3.7 Settlement Pattern, Nature and Type of Buildings

The housing environment in Kampala is far from satisfactory, characterized by sub-standard housing that is lacking both in quality and quantity. About 80% of households lack toilets. 34% of the city's housing stock is in need of upgrading or replacement, and another 36% are built of mud and wattle. 65% of the households in Kampala live in rental accommodation, with 71% occupying rooms as opposed to houses. Fifty four percent (54%) of the city residents live in tenements, 12% in stores and garages, and much of this housing is made of non-upgradable or semi-permanent materials. Living conditions are worse among poor households living in Kampala's informal settlements. In such settlements conditions are far from acceptable and a health hazard to the residents (UNEP, 2002; Rakodi, 2005). According to the Uganda National Housing Survey

2012/2013 report, a distribution of Kampala's main type of house construction materials was found to be as presented in Table 22 below.

Table 22: Distribution of Kampala's main type of house contruction materials (%)

	Roof			**Wall**			**Floor**		
Selected characteristics	Iron sheets	Thatched	Other Roof	Bricks	Mud and poles	Other wall	Earth	Cement	Other floor
Percentage	96	0	4	81.4	8.5	10.1	8	84.5	7.5

Source: Uganda National Housing Survey 2012/2013

Note:

On the table above:

Other roof includes asbestos, concrete, wood, tin;

Other wall includes concrete/stone, wood, tin/iron sheets;

Other floor includes tiles, bricks, stone and wood.

Kampala is a city with a lot of diversity in settlement pattern and building types. Settlements along the proposed road links and junctions are linear in nature and congested in most of the areas. The settlements comprise of both commercial and residential structures, educational and religious institutions. Most of the buildings in the project areas are of permanent nature. Temporary structures along the road are mainly in form of kiosks and market vending stalls. From our field observations, it was noticed that most of the project areas are located in un-planned neighborhoods with disorganized housing patterns. Examples of such areas include Calender Rest 1 junction and Namasole/Busabala junction, Kayemba road, Ssuna II among others. However, in sections of the roads, the settlements were well planned e.g. along sections of Sentema road, Nakawa Ntinda and other roads in the Central Business District. Commercial structures are close to the roads while residential structures are located a bit further from the road. Settlements also include public structures like schools and churches.

Along some roads or cluster of roads, high value buildings were noted. For example, along John Babiha / Acacia Avenue road, Ssezibwa road, Old Portbell road, New Portbell road, 5th, 6th, and 7th Streets, structures of high class such as restaurants, offices, shopping centres, factories and industries were noted. The owners of such property rent out the premises to a number of people for use. In case of any of engagements with property owners of such caliber, appointments will be made through officially writing to them. It is also expected that meetings may be held at their respective offices or premises.

Some of the roads are largely industrial and commercial compared to others e.g. 5th, 6th and 7th Streets, Acacia, Sezibwa, a section at the beginning of Nakawa-Ntinda roads from Spear Motors and Kibuye-Ndeeba-Nateete road, Kayemba road. Roads with majorly residential places include Tuba

road, Kigala, Lungujja and Old Mubende road. Others have almost a balalnced mixture of residential and commercial.

Details of the different settlements patterns are provided in a separate report attached to this report as Appendix XV.

3.2.3.8 Transport and Communication

Both Kampala and Wakiso Districts are vibrant areas with transport facilities including taxis, buses, personal vehicles, motor cycles commonly known as boda bodas and bicycles. The roads are also used by heavy trucks and lorries transporting all kinds of goods. Pedestrians including school children are also a common sight along the Kampala and Wakiso roads. The nearby port at Port bell in Luzira is also a major link for transporting passengers and goods from Kampala to other parts of Uganda and the East African region. Road transport is the main means of transport within the two districts.

"Kampala City has approximately 1200km of roads of which about 450km (38.0%) are paved and 750.0 (62%) km are unpaved. A significant portion of the unpaved network is heavily trafficked with over 300 vehicles per day. Almost 80% of the paved roads and 99% of the unpaved roads are in fair-to-poor condition due to a heavy maintenance backlog. The roads are characterized by potholes, distortions, cracks, etc, and the level of service is low" (*SMEC Pty Ltd, 2015).*

The proposed road links and junctions are currently in fair to poor condition. Some of the roads are paved but will require rehabilitation, others are paved but narrow and will require dualling while others are unpaved and will require upgrading to paved state.

Roads in poor condition include Kabuusu-Kitebi-Bunamwaya, Muteesa I road, Kirombe road, Kayemba road, Sunna I, Sunna II, Wamala road, Lungujja, Kigala, Old Mubende. These are characterized by potholes, lack of proper drainage, flooding and slippery during the rainy season and dusty during the dry season.

Most of the roads and junctions are characterized by heavy traffic during peak hours thus taking a lot of the users' time to reach the desired destination. Traffic lights are non-existent on most of the junctions whereby traffic is mainly managed by traffic policemen. In addition, very few roads have street lighting giving an opportunity to increase the crime rate in the city.

In regard to junctions, there are quite a number of junctions along the different roads. Some of the juncitons are very busy with many activities and characterized by heavy traffic while some are not. Taxi and boda stages were noted at several junctions along the different roads. Junctions with heavy traffic include Wamala-Wankulukuku Junction, Kabuusu Junction, Ndeeba Junction, Nateete Junction, Nakawa-Ntinda/Ntinda Trading Centre Junction etc. Among all the junctions, it's only Nateete which presently has traffic lights.

Taxi and boda boda stages were noted on the majority of the roads. Information from KCCA revealed that there were about 78 boda stages recognized by the Authority along the proposed road links and junctions as shown in Table 23 below. Consultations further revealed that the stages are recongnised, the y have not yet been legally designated. The enforcement law has also not yet been passed thus making it difficult to stop many boda boda stages from mushrooming from time to time. It should be noted that all stages irrespective of whether they are recognized or not, will require ample time (3-6 months) to vacate the areas when construction construction works begin.

Table 23: Boda boda stages srecognised by KCCA

Cluster / Road	**No of boda boda stages recognised by KCCA**
Cluster 1	23
Cluster 2	6
Cluster 4	6
Cluster 7	25
Sir Apollo	7
Namungoona	4
Buwambo Kitezi, Kyebando Ring, Luwafu, Kisasi 2,	7
Total	**78**

Communication companies such as MTN, Airtel, Warid Telecom, Smile Telecom, Africell, Telecom etc. provide Kampala and Wakiso residents and visitors with mobile communication services, internet services and all related communication services. There were telecommunication masts that were observed along some of the proposed road junctions.

Kampala is the home of quite a number of television and radio stations such as CBS, Super FM, Top Radio, Radio Sapientia, WBS, NBS, and Bukedde TV etc. CBS and Radio Sapientia are located near the Bulange Junction and Hanlon Junction in Nsambya respectively. The residents in the two project areas access information on different issues mainly through radios, televisions, telephones and newspapers. Figure 27 shows the main means of access to information by people along the proposed roads.

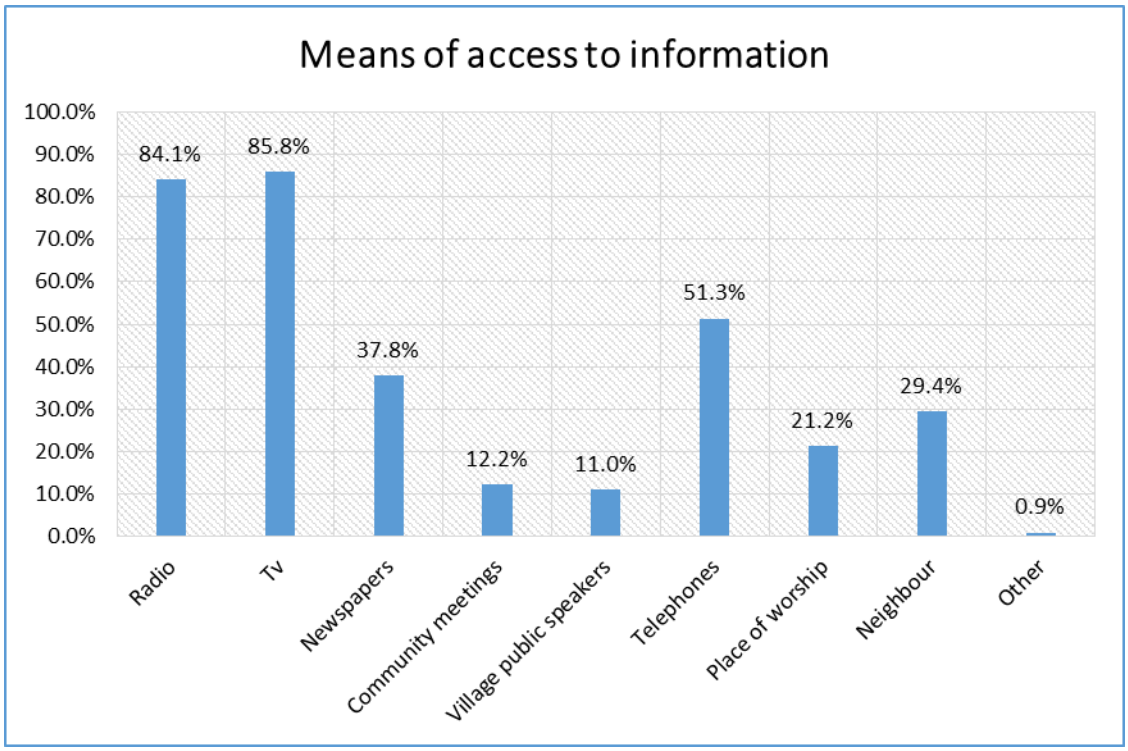


Figure 27: Means of access to information by households along the project roads

From the above analysis therefore the fact that there is a mixture of both the formal and informal sector in Kampala City, there is need to use communication channels that reach both categories. The following communication channels have thus been proposed during the construction phase of the project;

i. **Radio stations**: Bukedde FM, CBS FM, Top radio, Radio One, Power FM, K-fm, Capital Radio, and Super FM.
ii. **Print media:** Bukedde, New vision and Monitor newspapers respectively.
iii. **Television:** Bukedde TV 1, NTV, NBS, BBS Terefayina, UBC, Channel 44,
iv. The above media stations have wide coverage beyond Kampala and are the most listened to.
v. **Local village radio loud speaker announcements where available:** this reaches high population especially early in the morning while many leave for work and in the evening.
vi. **Religious gatherings**: The contractor can use the religious gatherings for all denominations to circulate information/ announcement regarding project activities.
vii. **Educational Institutions**: Information can be provided to the Heads of the Schools to circulate to students/pupils and parents especially on roads with schools.
viii. **Local leaders**: in particular village LCI, Councillors, Division Mayors,
ix. **KCCA technical staffs**: Town Clerks, Ward Administrators, Heads of Departments / Directorates (Gender, Health, Education etc.).

3.2.3.9 Water and Sanitation

a. Water supply

National Water and Sewerage Corporation is the main service provider of water and sewerage services in the two districts. Some households and institutions also practice rain water harvesting such as St. Peters S.S. Nsambya. Some households were noted collecting water from a protected spring along Wamala road, along the section towards Kampala University. According to consultations with people living along this section, it was revealed that the people heavily rely on this water source. Their alternative water source is a spring located about 1km or more from this water source. This community is thus considered vulnerable in terms of water supply hence an alternative water source will have to be provided prior to commencement of construction activities along this section.

NWSC water is accessed through house connections and yard tap connections. Households without house connections access water through buying from those with yard tap connections. According to the results of the household survey along all the project roads, the main water sources for households is as shown in Figure 28.

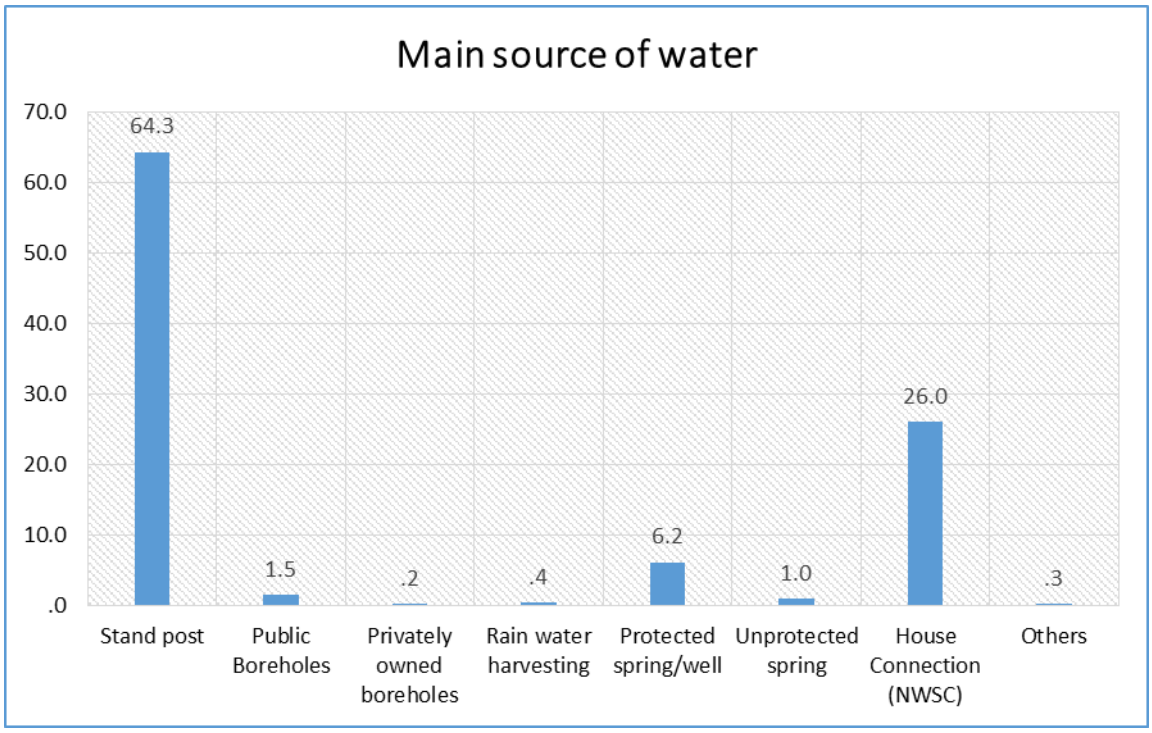


Figure 28: Main source of water for households along the project roads

Seventy Seven percent (77%) of the respondents said that water was sufficient throughout the year, 18.8% reported that it was insufficient during the dry season and 4.2% said that it was not

insufficient throughout the year. The majority of the households (86.2%) move less than 500m to reach the water source.

b. Sanitation

Waste disposal in Kampala and Wakiso is currently a major challenge and is a threat to sanitation and the health of the people in the city. The types of wastes generated by the people of Kampala and Wakiso include, food wastes, liquid wastes, plastics, industrial waste from small scale industries etc. These are disposed of anyhow by the people through dumping along road sides, dumping in empty pieces of land, scattering anywhere, dumping in channels etc. Poor garbage disposal was noticed on quite a number of the project roads where garbage was littered anyhow along the roads. Such roads include Muzito road, Buwambo Kiteezi road, Sunna I and II roads, Kayemba road, Kibuye-Nateete-Busega road, Kulambiro-Najeera and Kulambiro ring among others.

Solid waste management in Kampala city is done by the Kampala Capital City Authority assisted by some contracted private garbage collectors. About 10% of the households in the city are served by KCCA, assisted by private garbage collection firms, while the remaining waste is disposed of by the generating households.

The Kampala Capital City Authority (KCCA) begun installing garbage bins along the streets to ease garbage collection in Kampala central business. The bins are designed to accommodate recyclable and non-recyclable waste materials that Kampalans keep throwing around, littering the city. The project is currently being piloted in the Central Business District with at least 1,000 garbage bins planned for installation. Along some of he project roads, KCCA trucks or private trucks were noticed collecting the littered or heaped garbage along the roads. These roads include Katalima and, Ntinda-Kisaasi among others.

In regard to latrines, 63.2 percent of households in Kampala use pit latrines while 14 percent use water borne toilets. The other 22.4 percent use VIP latrines while 0.4 percent have no access to toilet facilities. (Uganda National Housing Survey 2012/2013). The report also highlights that 83.8 percent of households in Kampala have no hand washing facilities. The socioeconomic survey for households along the project roads showed that 99.8% of the households had access to toilet facilities. Out of the households with access to toilet facilities, 45.1% use the traditional pit latrine.

In general, sanitation along the proposed roads is poor. There is need for change of attitude and behavior when it comes to garbage disposal. A lot of effort and enforcement of strict laws will be required by the KCCA authorities in terms of proper waste disposal to avoid or minimize waste disposal in the newly constructed drainages and along the roads. Some communities litter garbage along the roads while others litter it in existing drainage channels both built and natural channels. Communities that litter garbage in natural streamsinclude those along the following roads; Kabuusu-Kitebi-Bunamwaya –in the Sembuule drainage, Ssuna I, Ssuna II, Muzito road, Wamala road, Kirombe road, Kulambiro-Najeera road, Tuba road and, New Portbell road towards the pier.

3.2.3.10 Education

Education is widely recognized as an engine for empowerment, economic growth and general improvement in welfare. It is one of the most influential determinants of an individual's knowledge, attitudes and behaviour. Kampala and Wakiso are one of the leading areas in terms of educational facilities at all levels i.e. Pre-Primary, Primary, Secondary and Tertiary level.

According to KCCA Ministerial Policy Statement (2013-14) Kampala has a total of 2,092 public and private education institutions (Table 24). These include 803 Pre-primary schools, 964 primary schools, 295 secondary schools and 30 tertiary institutions. Lubaga division has the highest number education institutions with 26.2% of all schools in Kampala. Lubaga division is followed by Makindye (25.3%), Kawempe (23.8%) and Nakawa (17.4%). The central division has the least number of schools with only 7.2% of the entire schools in the city. Other education programmes include Special Needs Education (SNE). Kampala for instance has got special needs schools such as Nakawa School for the deaf, Naguru Remand Home, Ntinda School for the deaf and Mulago School for the deaf. There are also schools with inclusive education (with special needs units) such as Naguru Preparatory school, Kyambogo Primary School and Wandegeya Muslims Primary School.

Table 24: Distribution of Schools in Kampala Disstrict

Division	**Pre-primary**	**Primary**	**Secondary**	**Tertiary**	**Total**	%
Lubaga	220	226	90	13	549	26.2
Makindye	210	243	72	4	529	25.3
Kawempe	215	230	51	2	498	23.8
Central	48	65	30	8	151	7.2
Nakawa	110	200	52	3	365	17.4
Total	**803**	**964**	**295**	**30**	**2,092**	100.0

Source: KCCA Ministerial Policy Statement 2013-2014

According to Wakiso District Development Plan (2010/11 – 2014/15), the district has a total of 567 primary schools with 246 government, 257 private and 64 community schools. For secondary schools, the district has over 139 schools, 18 are government, 73 private and 48 community. It also has 1 Teacher Training College, 2 Technical Institutes, Nkumba University, Meteorological School and Fisheries Training Institute (Vocational Institutes).Wakiso District has some of the best performing schools in the country especially in Ordinary level and Uganda Certificate of Education (UCE).

There are schools located along almost all the roads most of which are private primary schools. There are also high institutions of learning that are found on some of the roads e.g. Kampala

University of Nursing and Health Sciences along Wamala road, Ndejje University along Sentema road and Multitech Academy along Sir Apollo Kagwa road.

3.2.3.11 Health

According to UBOS Statistical Abstract 2015, the number of health facilities in the two districts is as shown in the Table 25 below.

Table 25: Number of Health Facilities in Districts by ownership status, 2012/13

District	Government	NGO	Private	Total
Kampala	20	40	1,332	1,392
Wakiso	63	40	-	103
Total	**83**	**80**	**1,332**	**1,495**

Source: UBOS Statistical Abstract 2015

Along the project roads, several health facilities mainly privately owned were noted. Some of the health facilties that residents along the roads use include St. Francis Nsambya Hospital in Makindye Division (which is in the vicinity of Hanlon-Nsambya Junction), Mulago National Referral Hospital in Kawempe Division, Mengo Hospital, Kitebi Health Clinic in Lubaga Division, Kampala Capital City Authority Clinic Kisenyi Health Centre in Central Division, Komamboga and Naguru Hospital in Nakawa Division. There are also other medical facilities such as Nakasero Hospital, in Central Division, Case Clinic, and many private health facilities including pharmacies, Nursing homes and drug shops. Another prominent health facility within the project area is Busabala road Nursing Home located near Namasole-Busabala junction in Makindye Division.

The people in Kampala and Wakiso get medical services based on their choice of a health facility.

In regard to diseases, malaria is the most common disease as reported by 54.3% of the households along the project roads (Figure 29).

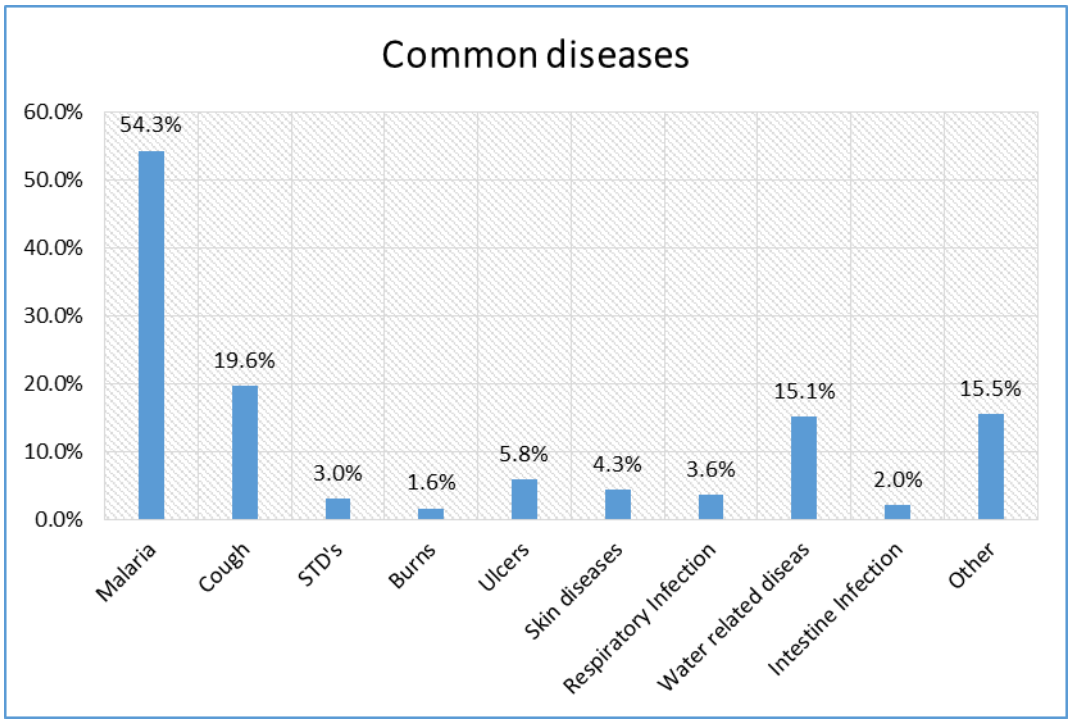


Figure 29: Common diseases among residents along the project roads

According, to The HIV AND AIDS Uganda Country Progress Report 2014 (15th June 2015), the two rounds of AIDS indicator survey showed that HIV prevalence in the general population in Uganda increased from 6.4% in 2004/2005 to 7.3% by 2011. The HIV prevalence stabilized around 7.4% in 2012/2013.

The report further reveals that Uganda is still classified as a high burden country with high number of persons living with HIV which has continued to increase. This is as a result of continued spread of the disease and increased longevity among persons living with HIV. The national projections show an increasing number of people living with HIV i.e. 1.4 million in 2011 to 1.6 million in 2013 and to 1.5 million in 2014 and a high number of orphans of about one million due to AIDS.

The report also indicates that there are still marked variations in the prevalence rates by social dynamics and geographical areas with the central region having one of the highest prevalence rates of up to 10.6%. The HIV prevalence was reported to be higher in women (8.3%) compared to men (6.1%).

According to the socioeconomic survey study of households along the different roads, 99.3% of them had heard of HIV/AIDS and how it was spread while 68.2% had had someone who declared that they were HIV/AIDS positive. The results show a high awareness level of HIV/AIDS among the people along the roads. This is attributed to the government efforts and campaigns against the disease.

3.2.3.12 Vulnerable groups

A vulnerable group is a population that has some specific characteristics that make it at higher risk of falling into poverty than others living in areas targeted by a project. Vulnerable groups include the elderly, the mentally and physically disabled, at-risk children and youth, ex-combatants, HIV/AIDS affected individuals and households, religious and ethnic minorities and women (World Bank website, accessed on 24th December 2015).

Like any other society, there are vulnerable groups along the project roads such as the female headed households, household headed by the disabled, the elderly and people living with HIV/AIDS, children etc.

The socioeconomic household survey carried out along the proposed roads showed that 20.3% of the households have an orphan in their homes, 6% of the households have a disabled person in the home, 28.3% of the households are headed by females and 5.5% of the households are headed by the elderly (65 years and above).

The vulnerable groups normally face a number of problems which include; heavy workload on women, low level of participation in decision making, lack of ownership of resources, abuse and neglect of orphans, discrimination against and marginalization of people with disabilities, low incomes and thus high levels of poverty, and high levels of illiteracy etc. The project planners should put into consideration vulnerable groups when making key decisions for households along the roads.

Vulnerable groups/persons and their numbers directly affected by land acquisition will be determined during the preparation of the RAP.

3.2.3.13 Gender

Gender is a critical variable in the development process. It identifies the social differences between men/boys and women/girls. It particularly addresses women's' interests as regards their roles in relation to those of men.

According to the provisional results from the Housing and Population Census 2014 *(Source: UBOS November 2014 Revised Edition),* 51.4% of the population in the country is comprised of women. Women constitute 51.4% and 52.5% of the total population in Kampala and Wakiso Districts respectively yet their accessibility to productive resources is limited compared to their male counterparts.

Few of the women own land, which is the principle means to survival. They lack capital and access to financial services in the form of banking services. Lack of control over land and other productive

activities makes women more vulnerable. The main gender issues include unequal distribution and access to resources, opportunities, benefits and decision-making mandate among others.

In general, women's access to land is usually through their spouse or male members of their family. Loss of the spouse increases the chances of violation of their rights to land. However, in urban areas, some working women are able to purchase land and in cases where poor women have taken on the role of family breadwinner such as when widowed, women have full control of land.

The socioeconomic household survey carried out during the assessment showed that 74.3% of the male household heads' wives did not own land. However, 41.3% said that their wives were allowed to make decisions on issues regarding land.

In regard to different roles of men and women, in the urban areas many women have to a large extent taken up the role of looking after the family in every sense of the word e.g. paying school fees, providing medical care, buying food etc. in addition to household chores. Women have thus taken up all kinds of work in order to fulfil their current family obligations. They are engaged in trade, urban farming, casual labour, wage employment, formal employment etc.

3.2.3.14 Tourism

Kampala and Wakiso districts have quite a number of tourist attractions in the form of recreation facilities, traditional places, spiritual places, monuments etc. These include the National Museum, the famous Kasubi tombs, Kabaka's Lake, Buganda Kingdom Headquarters at Bulange Mengo, Kabaka's palace (Lubiri, Mengo), the Uganda National Cultural Center, Wamala Tombs, Namugongo Martyrs' Shrine, Entebbe Botanical Gardens, Naggalabi Buddo Coronation site, the Uganda Wildlife Education Centre (UWEC) among others.

3.2.3.15 Security

The crime rate in Kampala and Wakiso District is of recent very high. Types of crimes include thefts such as pick pocketing, residential and other property break-ins, vandalism of vehicles on streets; murders, assaults, defilement and rape among others. Security in both districts is managed by the Uganda Police, the Uganda People's Defence Forces (UPDF) and private security organisations such as Saracen, KK Security, Security Group Uganda, G4S Security Services Uganda Ltd, Ultimate Security etc. There are quite many police posts along the different roads where people can report crimes.

3.2.3.16 Non-Government Organisations

There are quite a number of non-government organisations with offices along the project roads. Table 26 shows some of the NGOs identified along the different roads.

Table 26: NGOs along different project roads

Name of NGO	Main services offered
Cornerstone Development Uganda	Support to street kids
International Union for Conservation of Nature (IUCN)	Support conservation of nature
Africa Centre For Global Health & Social Transformation	Health System Strengthening & Health Policy Formulation
Katalemwa Cheshire Home for Rehabilitation Services	Rehabilitation, health, counseling, education
ACDI/VOCA	Business training, empowerment of people, guidance on life and survival skills
Belgian Development Agency	Bilateral agreement between government of Uganda and Belgium
Voice Of Africa	Spreading Islam
Solidarity of Compassionate	Empowerment of refugees, linguistic training, life skills training, teaching and marketing of craft skills and items
AVEC International	Child Sponsorship and Empowerment
Charity Children Ministry	Health and Education, counseling
American Refugee committee	Looking after displaced people (Refugees) and Rebuild the lives of the refugees
Family Welfare Movement	Education
Integrated Rural Development Initiatives	Supporting capacity development of rural communities, livelihood projects, environment concerns, climate change and food security
SEND A COW	Reaching out to the poor
NACHWOLA	Counseling and guidance
Ntinda Development Organisation	Carpentry, metal fabrication, savings and credit
Rock of Ages Family Ministry	Fellowship and Bible study
Relate counseling	Counseling
National Union of Women With Disabilities Of Uganda	Advocating for women's and girls' rights with disabilities
Missionaries of the Poor	Look after children
L'ARCHE Uganda	skills training to children with intellectual disabilities
National forum of PLHA networks in Uganda	HIV/AIDS advocacy and coordination
Uganda Young Positives	Advocacy & research, lobbying, peer

Name of NGO	Main services offered
	support, platform for young people
United Nations High Commission for Refugee (UNHCR)	Supporting and settlement of internally displaced people.
Water Aid Project	Toilet services, supply clean water to the community
AYEC International	Advocacy and capacity building and counseling services

3.2.3.17 Planned development activities

There are no known planned or ongoing development activities along these roads that could interrupt project activities or that could cause displacement to the people. Development activities observed were mainly private oriented in the form of construction of commercial or residential buildings.

3.2.3.18 Archaeology and cultural resources

Uganda is endowed with both tangible and intangible cultural resources that have social, economic, historic, and technological/architectural, research and aesthetic significance. In Kampala city, the most notable tangible cultural resources include historic traditional monuments, forts, temples and shrines that are located within and nearby vicinities. There are more than 70 built heritages that have been identified so far by the Department of Museums and Monuments under the Ministry of Tourism, Wildlife and Antiquities. Some of these are Kasubi Royal Tombs, Lubiri Kabaka's Palace, Lukiiko (Parliament of Baganda), Uganda Marty's shrine Namugongo, the Munyonyo Catholic church, Rubaga Cathedral, Namirembe Anglican Cathedral, Kibuli Mosque, Gaddafi National Mosque, the Baha'i Temple, the Independence Monument, Fort of Captain Lugard, the Pan African Freedom Park, The Clock Tower and European Cemetery. Some of these sites are shown in Plate 13 below.

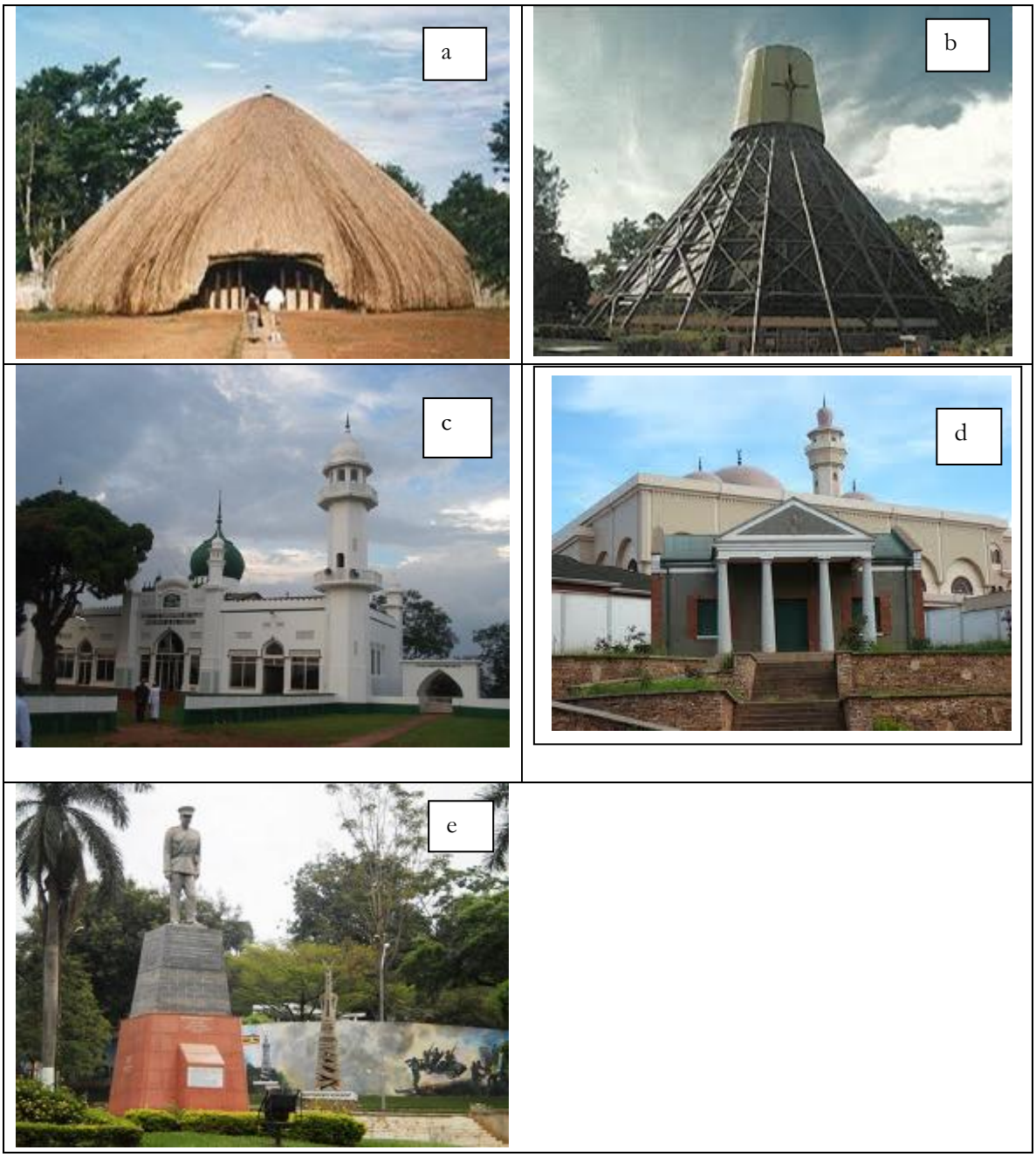


Plate 13: Kampala's built heritage: (a) Kasubi tombs; (b) Uganda Marty's shrine Namugongo; (c) Kibuli Mosque; (d) Captain Lugard's Fort; (e) Independent monument

Other places of historical, traditional and cultural significance are historical buildings, churches, mosques and traditional/cultural/religious shrines. These tangible resources (historical and cultural/traditional monuments) carry intangible cultural practises, norms, beliefs, knowledge in connection to religion, tribal customs, people's attitudes and desires.

The above mentioned cultural built heritage resources are therefore valued by people within and outside Uganda. Their cultural significance exist at local, national and international levels. They also act as a good source of information in relation to history and culture of the people in Kampala and Uganda in general. It should be noted that the mentioned resources are within Kampala city but located outside the zone of immediate impacts.

Archaeological resources

The Kampala City is heavily built as already noted. It was not possible to penetrate easily during the surveys. Also it should be well-known that the roads and junctions are currently in use. No declared or recorded archaeological sites were identified within the project area. Based on the findings of the archaeological field survey undertaken for this project, most of the proposed roads and junctions are less potentially impacted areas.

Paleontological sites

No declared paleontological remains are found within the project area (selected roads and junctions).

Traditional Shrines

One of the cultural related affairs identified are shrines, owned by individuals. One is located at 36N 0452288 UTM 0045015 at Buwambo - Kitezi road (*Kawempe*) 25 metres from the road. Another found at 36 N 0454894 UTM 0032184 at Kirombe road (*Makindye)* approximately 15 metres from the road. These shrines are used by traditional healers and local people visit these sites for treatment, sacrifice and prayers. They comprise of things such as fire place, pots, calabashes, arrows, skins of animals, some cloth pieces (in black, white and red colours) and traditional herbal medicines to mention few. These shrines are located a bit far from the roads and within settlements. It should be noted that they will not be affected directly by the project activities.

Burial places

These are culturally sensitive areas. Recently most people/families tend to have burial grounds nearby their houses. This is attributed to African traditions that the dead still have strong connection with their relatives. Also the family members need to take good care of them. Burial places are valued by the families/community at large, they need to be treated with respect. In most cases graves act as sacred places for some people. Located at 36N 0452334 UTM 0044630 Buwambo - Kitezi road and approximately 10 metres distance from road (Plate 14) are likely to be affected by the project activities. However the actual impact will be established during the Resettlement Action Plan study for the project

Plate 14: *Burial Place along Buwambo Kitezi Road*

Cultural Monument/ Kabaka's round about

The monument (Plate 15) links the road that leads to both the kingdom's seat in Bulange, Mengo, and the Kabaka's official palace at the Lubiri, Mengo. The roundabout for the king of Buganda, is located at 36N 0451140 UTM 0034176 in *Lubaga*. The buildings linked by this round about and the gate carry cultural, education/information, architectural, economic and aesthetic value.

Plate 15: *Kabaka's gate (round about)*

The Cultural findings per road and junction are presented in Table 27 below.

Table 27: Cultural Environment of project roads and junctions

Cluster no.	Roads	Cultural Environment
1.	**Kabuusu, Ssuna I, Ssuna II, Muzito and Wamala roads**	Located on residential heavily built areas. There are also commercials activities along the road sides. No archaeological or heritage assets recorded.
2.	**Lukuli and its 1 junction (Kayemba-Lukuli), Kirombe and its 2 junctions (Kabega Gogonya and Gogonya- Nsambya Estate road junction), Kabega and its 1 junction (Hanlon-Kabega), and Kayemba and its 1 junction (Kayemba-Katwe)**	These roads and junctions are located in areas for both residential and commercial buildings. Cultural related affairs noted include church and traditional healer shrine. Tradition healer shrine located at 36 N 0454894 UTM 0032184 at Kirombe road (*Makindye)* approximately 30 metres from the road. Whereas the church is located nearby to Hanlon Nsambia junction.
3.	**Tuba, Kulambiro Najeera and Kulambiro ring roads**	Built up areas with building structures for residential and other activities. Cultural related affairs noticed was a family burial ground along Kisasi- Kulambiro Najeera road at 36 N 36 N 0457885 UTM 0042273 approximately 35 to 40 meters from the road.
4.	**Nakawa Ntinda and its 3 junctions (Naguru, Matrys way, Ntinda T/C), Ntinda – Kisasi, Bukoto-Ntinda and its junction (Magambo)**	No archaeological materials or cultural receptors recorded.
5.	**Naguru and Katalima roads and Lugogo bypass 2 junction**	Heavily built up areas, with road side human activities. No archaeological or cultural resource within the surroundings
6.	**Sssezibwa and Accasia Avenue /John Bahiha roads**	Built up areas, no archaeological materials were found.
7.	**Newportbell and 3 junctions (Mbuya Barracks, Super oil Mutungo, Bank of**	These roads are located in heavily built up areas. No archaeological materials or cultural related assets recorded.

	Africa, Luzira), Old Portobell and its 3 junctions (Tuskys Bugolobi, MTN Bugolobi and Shell Bugolobi).	
8.	**5th Street, 6th street, 7th street and 8th street:**	These roads are located in area characterized by presence of permanent structures to include; factories, stores, depots and residential houses on 8th street. No archaeological or cultural assets were recorded.
9.	**A 109 and its junctions, Kigala and 2 junctions, Lungujja and its 7 junctions, Old Mubende, Mugema, Sentema Raod and junction, Muteesa I**	These roads are located on areas characterized by residential houses and road sides' commercials activities. There were no archaeological or cultural materials recorded.
10.	**Sir Apollo Kagwa**	Heavily built up along the road sides, no archaeological materials were found.
11.	**Namungoona**	Built up area with activities along sides of the road. No archaeological materials were found.
12.	**Buwambo Kitezi**	Cultural related affairs noticed were a mosques and burial site. Located at 36 N 0452284 UTM 0044465 approximately 15 to 20 meters from the road, also family burial site at 36N 0452334 UTM 0044630 about 30 metres distance from road that are likely to be affected. However the actual impact will be established during the Resettlement Action Plan study for the project.
13.	**Kyebando Ring 2**	No archaeological materials recorded
14.	**Luwafu**	There are spaced houses, banana garden along the road and other economic related activities. No physical cultural materials found.
15.	**Kisaasi Road 2**	No archaeological materials recorded around this place
Cluster no.	**Junctions**	**Cultural Environment**
1.	**Military Police**	This junction is surrounded by houses and other economic activities are located around (shops, supermarket and fuel station). No archaeological materials were found.
2.	**Calendar rest I**	The junction is surrounded buildings for settlements,

		commercials and other social services. No physical cultural resources were found
3.	**Namasole /Busabala**	Heavily built up area (congested settlements), road side activities such as selling food staffs garage and welding points. No cultural related affairs recorded
4.	**Hanlon-Nsambya**	It is a very busy road, surrounded by school, hospital and a radio station. No archaeological or cultural resources found
5.	**Lugogo bypass 1**	The junction is surrounded by commercial buildings. No archaeological materials or cultural related affairs were recorded.
6.	**Lugogo bypass 2**	Already covered under Cluster 5 for roads
7.	**Kabalagala**	Built up area, no archaeological materials were recorded
8.	**Kabuusu and Ndeeba**	These junctions are located in commercial areas. These areas are very busy surrounded by shops, fuel stations, bars and restaurants. No archaeological materials were found nor cultural related affairs.
9.	**Kivebulaya**	Heavily built area, no archaeological materials were recorded.
10.	**Bulange**	This junction is located between the Lubiri Mengo and Bulange Mengo Palaces (recently constructed). Cultural asset found include the historical monument the Kabaka's gate located at (36N 0451140 UTM 0034176)
11.	**Kawempe**	The junction is surrounded by buildings. No archaeological or cultural assets was found in this area.

4. CHAPTER FOUR: ANALYSIS OF PROJECT ALTERNATIVES

Under this chapter, the proposed project design options are analysed. The No project option is also discussed.

4.1 Alternatives' Analysis method

The principle used in the choice of alternative was to minimize both the environmental and social impacts, technical challenges and the cost of construction. The rating method for comparing and evaluating alternatives was used. Rating involves the use of pre-determined rating scheme. "Weighing –scaling" or "Rating" methodology embody the assignment of relative importance weights to environmental factors and impact scales or rating for each alternative to each factor (Canter, 1996:545-546). Parameters to be used could be looked at individually or as overall on each component considered. The parameters used in choosing the best alternative were assigned scores ranging from 1- 4 which are defined differently depending on category of options. The parameter scores for each alternative were summed up and the option with the lowest score was then the recommended alternative from an overall perspective. In some cases however the recommended alternative following the analysis was not the alternative selected for implementation. Justification for not selecting the recommended alternative following the analysis was given as required under section 4.1.1.2 of the Guidelines for Environmental Impact Assessment in Uganda.

4.2 Alternatives' analysis

4.2.1 No action (No project) scenario

This option involves not undertaking the proposed project. With this option, the benefits expected from the project such as improved mobility of vehicles phase, reduced dust levels, reduced flooding improved drainage and sanitation, and reduction in traffic jams during would not be realized. The option would eliminate the adverse impacts of the project highlighted in Chapter 7 of this report. However this is not reason enough to recommend this option against the action alternative since the adverse impacts are mitigable.

4.2.2 Pavement material options

Two material options have been proposed for the base layer and sub base layers for higher order roads. These are;

Material	Layer
G45 gravel (CBR 45%) Vs. G80 Crushed aggregate	Sub-base layer
Crushed rock vs. bitumen base	Base layer

The options are scored as presented in Table 28 below.

Table 28: Analysis of high order roads' base and sub base layer material alternatives

Parameters	Score definition	Material for higher order roads							
		Sub base layer				Base layer			
		Option 1: G45 gravel (CBR 45%)		Option 2: G80 crushed aggregate		Option 1: Crushed rock		Option 2: bitumen base	
		Details	Score	Details	Score	Details	Score	Details	Score
Environmental impact									
-Impacts related to extraction of material e.g. changes in geological structure and related hazards,	1: Low 4: High	Less impact since it would require less effort for extraction of material	1	Has more impact since it would require more effort for extraction of material	2	Has more impacts since crushed rock would have to be acquired	2	Has no impacts no crushed rock would have to be extracted	1
Social impact									
-Impacts related to extraction of material e.g. occupational accidents, destruction of property	1: Low 4: High	Less impact since it would require crushing of material	2	Has more impact since it would require crushing of material	3	Has more impacts since crushed rock would have to be acquired	4	Has no impacts no crushed rock would have to be extracted	1
Technical									

Parameters	**Score definition**	**Material for higher order roads**							
		Sub base layer				**Base layer**			
		Option 1: G45 gravel (CBR 45%)		**Option 2: G80 crushed aggregate**		**Option 1: Crushed rock**		**Option 2: bitumen base**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**	**Details**	**Score**
- *Construction Duration*	1: Short 4: Long	Shorter construction period since material would not require crushing	1	Longer construction period	3	Construction duration would be longer	3	Construction duration would be shorter	2
Financial (Cost of construction)	1: Low 4: High	Not Available (NA)	NA	NA	NA	NA	NA	NA	NA
Total score			**4**		**8**		**9**		**4**

As per the score table above, **Option 1: G45 gravel (CBR 45%)** for sub base layer with the least score is the recommended option and has been selected for implementation. **Option 2: bitumen base** for base layer with the least score is the recommended option. However both options will be used; Bitumen base for bitumen base pavement and crushed rock for crushed stone base roads.

4.2.3 Material thickness for high order roads

Different material thicknesses have been proposed for crushed stone base for higher order roads' layers as follows;

Thickness	Material	Layer
150mm Vs. 225-300mm	G45 gravel (CBR 45%)	Sub-base layer
150mm Vs. 175-200mm	Crushed rock	Base layer

The material thickness options are scored as presented in Table 29 below.

Table 29: Analysis of material thickness alternatives for crushed stone base for higher order roads' layer

Parameters	Score definition	Material thickness for higher order roads							
		Sub base layer G45 Gravel (CBR 45%)				Base layer crushed rock			
		Option 1: 150mm		Option 2: 225-300mm		Option 1: 150mm		Option 2: 175-200mm	
		Details	Score	Details	Score	Details	Score	Details	Score
Environmental impact									
-Impacts related to extraction of material e.g. changes in geological structure and related hazards	1: Low 4: High	Less impact since it would require acquisition of less material	1	Has more impact since it would require acquisition of more material	2	Less impact since it would require acquisition of less material	1	Has more impact since it would require acquisition of more material	2
Social impact									

Parameters	**Score definition**	**Material thickness for higher order roads**							
		Sub base layer G45 Gravel (CBR 45%)				**Base layer crushed rock**			
		Option 1: 150mm		**Option 2: 225-300mm**		**Option 1: 150mm**		**Option 2: 175-200mm**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**	**Details**	**Score**
-Impacts related to extraction of material e.g. occupational accidents, destruction of property	1: Low 4: High	Less impact since it would require acquisition of less material	2	Has more impact since it would require acquisition of more material	3	Less impact since it would require acquisition of less material	2	Has more impact since it would require acquisition of more material	3
Technical									
- *Construction Duration*	1: Short 4: Long	Shorter construction period	1	Longer construction period	3	Shorter construction period	1	Longer construction period	3
Financial (Cost of construction)	1: Low 4: High	Cheaper since less material is acquired	2	More expensive since material would have to be acquired	3	Cheaper since less material is acquired	2	More expensive since material would have to be acquired	3
Total score			**6**		**11**		**6**		**11**

As per the score table above, **Option 1: 150mm** for both **Sub base layer G45 Gravel (CBR 45%) and Base layer crushed rock** with the least scores are the recommended options and were the options required by the developer. However option 2 is selected implementation following the Road Design Manual (RDM-Vol 3 Pavement Design) provided by the Uganda Ministry of Works and Transport that is the reference for the design.

4.2.4 Traffic Accommodation

Accommodating the high volumes of vehicles on almost all the roads to be upgraded will be a major challenge on this project. Two remedial options during road construction have been proposed;

1. Closing off sections of roads to allow for unimpeded construction.
2. Means of stop/go conditions in partial-width construction

The two options are scored as presented in Table 30 below.

Table 30: Analysis of Traffic accommodation alternatives

Parameters	**Score definition**	**Traffic accommodation**			
		Option 1: Closing off road sections		**Option 2: Stop/go conditions in partial-width construction**	
		Details	**Score**	**Details**	**Score**
Environmental impact	Not applicable (na)	na	na	Na	na
Social impact					
-Traffic congestion and delays	1: Low 4: High	Less traffic congestion since it is envisaged that traffic will be diverted to other existing roads	3	More traffic congestion and delays	4
Technical					
Construction interruptions	1: low 4: high	Construction will not be impeded by traffic	1	Construction may be impeded by traffic	2
Financial (Cost of construction)	1: Low 4: High	na	na	Na	na
Total score			**4**		**6**

As per the score table above, "Option 1: Closing off road sections" with the least total score is the recommended option. However both options are proposed for implementation. Option 2 would be used where option 1 is not possible such as in situations of no road diversions.

4.2.5 Road classification for Kayemba road

The roads under this project will be classified in accordance with the KCCA Road Classification Criteria, with the project roads falling in the KA to KI classes described under Section 2.9.9.

Two options of Road classification were proposed for Kayemba road; KA (Arterial road; 4 Lanes) and KC (Local road; 2 lanes).

The two options are scored as presented in Table 31 below.

Table 31: Analysis of Kayemba road classification alternatives

Parameters	**Score definition**	**Road Classification**			
		Option 1: KA (Dualling)		**Option 2: KC (single carriage way)**	
		Details	**Score**	**Details**	**Score**
Environmental impact					
-Impact on plant and bird Species of conservation concern	1: Low 4: High	No plant and bird species of conservation concern were observed by the road therefore none would be affected	1	No plant and bird species of conservation concern were observed by the road therefore none would be affected	1
Social impact					
-Destruction of property	1: Low 4: High	Potentially significant property destruction	4	Minimal property destruction	2
Technical					
Construction duration	1: Short 4: Long	Construction duration would be longer	3	Construction duration would be shorter	2
Capacity to handle current and potential traffic volumes	1: High 4: low	Would be able to handle current and potential traffic volumes	2	Would be able to handle current and potential traffic volumes	2
Financial (Cost of construction)	1: Low 4: High	More expensive	3	Less expensive	1

Total score			**12**		**7**

As per the score table above, "Option 2: KC (single carriage way)" with the least total score is the recommended option and is proposed for implementation with respect to Kayemba road.

4.2.6 Typical cross sections

Three options of typical cross sections for the roads' upgrade have been proposed;

i. Full Typical Cross Sections

This option generally allows for two or four trafficked lanes, cycle lane, kerb and channel, and finally a sidewalk to accommodate pedestrians (Table 32). The option was considered too expensive to implement due to the wider roadway pavement that would impact heavily on properties adjacent to the roads.

Table 32: Full Typical Cross section details

Road Category	Description	Traffic Lanes (m)	Shared Path (cycle land and pedestrian	Kerb and Channel	Median Island	Road Lighting
KU	Urban Expressway	4 x 3.50	2 x 2.00	√	√	√
KA	Arterial Road	2 x 3.50	2 x 4.00	√	-	√
KB	Collector Road	2 x 3.25	2 x 4.00	√	-	√
KC	Local Road	2 x 3.25	2 x 4.00	√	-	√
KI	Industrial Road	2 x 4.00	2 x 1.50	√	-	√

ii. Reduced Typical Cross Sections

This set of Typical Cross Sections is based on the Full Typical Cross Sections, but in the case of the Dual Carriageway (Road Class KU) project roads the centre median island as well as the second lane in each direction is removed, except at major intersections. The width of the shared path at all road classes is reduced to 1.5m. The lane width of Road Class KC is reduced to 3.00m. Table 33 below summarizes the Reduced Typical Cross Section details. The option has reduced impact on the properties adjacent to the project roads compared to the full.

Table 33: Reduces Typical Cross section details

Road Category	Description	Traffic Lanes (m)	Shared Path (m)	Kerb and Channel	Median Island	Road Lighting
KU	Urban Expressway	2 x 3.50	2 x 1.50	√	-	√
KA	Arterial Road	2 x 3.50	2 x 1.50	√	-	√
KB	Collector Road	2 x 3.25	2 x 1.50	√	-	√
KC	Local Road	2 x 3.00	2 x 1.50	√	-	√
KI	Industrial Road	2 x 4.00	2 x 1.50	√	-	√

iii. Reduced (1m) Typical Cross Sections

This set of Typical Cross Sections is based on the Full Typical Cross Sections. Road Class KU is not revised, and remains as for the Reduced Typical Cross Sections. The width of the shared path at all road classes is reduced to 1.0m. Table 34 on the following page summarizes the Reduced (1m) Typical Cross Section details. The option has reduced impact on the properties adjacent to the project roads compared to the first two.

Table 34: Reduced (1m) Typical Cross Section Details

Road Category	Description	Traffic Lanes (m)	Shared Path (m)	Kerb and Channel	Median Island	Road Lighting
KU	Urban Expressway	2 x 3.50	2 x 1.50	√	-	√
KA	Arterial Road	2 x 3.50	2 x 1.00	√	-	√
KB	Collector Road	2 x 3.25	2 x 1.00	√	-	√
KC	Local Road	2 x 3.00	2 x 1.00	√	-	√
KI	Industrial Road	2 x 4.00	2 x 1.50	√	-	√

The typical cross sections' options are scored as presented in Table 35 below.

Table 35: Analysis of typical cross section alternatives

Parameters	**Score definition**	**Typical cross sections**					
		Full Typical Cross Sections		**Reduced Typical Cross Sections**		**Reduced (1m) Typical Cross Sections**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**
Environmental impact							
Degradation of habitats	1: Low 4: High	Severe habitat degradation wider roadway pavement	3	Reduced habitat degradation due to reduced roadway pavement	2	Reduced habitat degradation due to further reduced road way pavement	1
Social impact							
Destruction of property	1: Low 4: High	Severe impact on property	4	Reduced impact on property	3	Further reduced impact on properties	2
Technical							
- *Construction Duration*	1: Short 4: Long	Longer construction period	4	Shorter construction period	3	Shorter construction period	2
Financial (Cost of construction)	1: Low 4: High	High compensation costs for destroyed property	4	Reduced compensation costs for destroyed property due to reduced roadway pavement	3	Reduced compensation costs due to further reduced roadway pavement	2
Total score			**15**		**11**		**7**

As per the score table above, "Option 3 Reduced (1m) Typical Cross Sections" with the least total score is recommended. However the final cross section implemented on each of the roads combines features of each of the above three options, based on available roadway width and road user requirements (refer to Table 10).

4.2.7 Geometric design elements

Two options were considered for each of the design elements in Table 36 below.

Table 36: Geometric design element options

Design Element	Urban/Peri-Urban Option 1 (standard)	Urban/Per-Urban Option 2 (revised)
Design speed	50	30-70
Minimum passing sight distance	345	140
Minimum horizontal curve radius	100	60
Maximum super elevation	4	3
Crest Vertical Curve passing	126	20
Shoulder cross-fall	4	2.5

Column 2 presents standards as per the MoWT General Specification for Roads and Bridge Works the design standard required to be used for the project while column 3 presents revisions proposed by the design engineers. The revisions take into consideration the following;

- The need to balance cut and fill;
- The need to minimise land take beyond the existing road reserve;
- The need for inbuilt safety measures such as climbing lanes, right turn lanes, traffic calming measures;
- The need for adequate road user facilities such as bus bays and laybys, including space for vendor services;
- The need to protect vulnerable road users
- The need to minimise/protect or relocate utility services, and
- The need to avoid geological, hydrological and environmental problems.

The two options are scored as presented in Table 37 below.

Table 37: Analysis of geometric design element alternatives

Parameters	**Score definition**				
		Urban/Peri-Urban Option 1 (standard)		**Urban/Per-Urban Option 2 (revised)**	
		Details	**Score**	**Details**	**Score**
Environmental impact					
Adverse Impact on geological and hydrological environment	1: Low 4: High	More land take due to higher minimum horizontal curve radius, maximum super elevation and shoulder cross fall hence more impact on geological and hydrological environment	2	Less land take due to lower minimum horizontal curve radius, maximum super elevation and shoulder cross fall hence less impact on geological and hydrological environment	1
Social impact					
Land take beyond existing road reserve	1: Low 4: High	More land take due to higher minimum horizontal curve radius, maximum super elevation and shoulder cross fall hence higher likelihood for land take beyond existing road reserve	2	Less land take due to lower minimum horizontal curve radius, maximum super elevation and shoulder cross fall More land take due to higher minimum horizontal curve radius, maximum super elevation and shoulder cross fall hence lower likelihood for land take beyond existing	1

Parameters	**Score definition**				
		Urban/Peri-Urban Option 1 (standard)		**Urban/Per-Urban Option 2 (revised)**	
		Details	**Score**	**Details**	**Score**
				road reserve	
Adverse Impact on utility services	1: Low 4: High	More land take due to higher minimum horizontal curve radius, maximum super elevation and shoulder cross fall hence higher likelihood for impact on utility services	2	Less land take due to lower minimum horizontal curve radius, maximum super elevation and shoulder cross fall More land take due to higher minimum horizontal curve radius, maximum super elevation and shoulder cross fall hence lower likelihood for impact on utility services	1
Technical					
Possibility of inclusion of inbuilt safety measures e.g. climbing lanes, right turn lanes, traffic calming measures	1: High 4: Low	Higher construction cost from more land take reduces possibility	4	Reduced construction cost from reduced land take increases possibility	1
Possibility of inclusion of adequate road user facilities such as bus bays and laybys, including space for vendor services	1: High 4: Low	Higher construction cost from more land take reduces possibility	4	Reduced construction cost from reduced land take increases possibility	1
Possibility of installation of	1: High	Higher	4	Reduced	1

Parameters	**Score definition**				
		Urban/Peri-Urban Option 1 (standard)		**Urban/Per-Urban Option 2 (revised)**	
		Details	**Score**	**Details**	**Score**
measures for protection of vulnerable road users	4: Low	construction cost from more land take reduces possibility		construction cost from reduced land take increases possibility	
Financial (Cost of construction)	1: Low 4: High	Higher construction cost from increased land take	3	Lower construction cost from reduced land take	2
Total score			**21**		**8**

As per the score table above, Option 2: Urban/Per-Urban (revised) with the least total score is the recommended option and is proposed for implementation.

4.2.8 Design of Kayemba road underpass structure

Kayemba Road is a project road that requires upgrading to a surfaced standard. The first third of this road's total length, as one travels eastwards, is an existing surfaced road in a very dense urban setting. After this portion the road intersects with Queen's Way, indicated as Entebbe Road on Figure 30 below. At this intersection the surfaced portion of Kayemba Road terminates. To the east of Queen's Way is an existing railway line. This railway line is owned by the Ugandan Rail Corporation. Under both Queen's Way and the Railway line exists narrow structures (Plate 16 and 17) that are intended to function as pedestrian underpasses that link Kayemba Road east of the railway line to Kayemba Road west of Queen's Way.

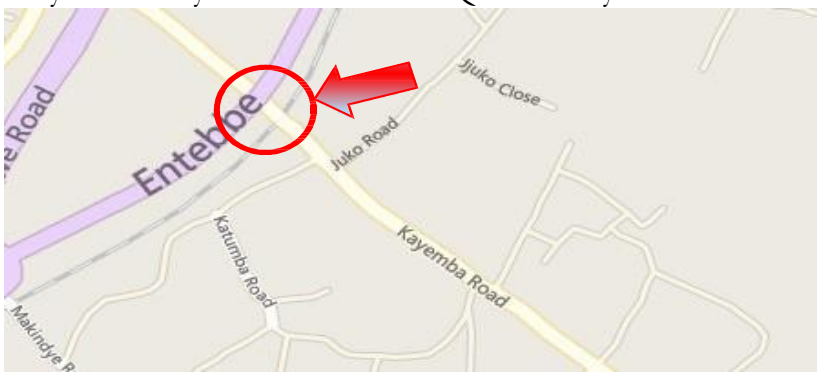


Figure 30: Location of Kayemba road

Plate 16: The underpass structure under Queens Way

Plate 17: The underpass structure under the railway line

There is a design option to upgrade the pedestrian underpasses on Kayemba road to accommodate vehicles as well. This option would link the two separated portions of Kayemba road and hence increase mobility between the areas east and west of Queen's Way and the Railway line. The option may be interfered with by an upcoming project (construction of a Bus Rapid Transport (BRT) Route) on Queen's Way to start at Kayemba road.

Another design option is to upgrade only one of the under passes, the one under the railway line. This option would eliminate any impact that the construction of a Bus Rapid Transport Route would have on the project.

The two design options are scored as presented in Table 38 below.

Table 38: Analysis of Kayemba Road design alternatives

Parameters	**Score definition**	**Road Classification**			
		Option 1: Upgrade of underpass at Queens way and at railway line		**Option 2: Upgrade of only the underpass at the railway line**	
		Details	**Score**	**Details**	**Score**
Environmental impact					
-Impact on plant and bird Species of conservation concern	1: Low 4: High	No plant and bird species of conservation concern were observed by the road therefore none would be affected	1	No plant and bird species of conservation concern were observed by the road therefore none would be affected	1
Geological impact e.g. change in geological substructure	1: Low 4: High	Higher impact with more excavations	2	Less impact with less excavations	1
Social impact					
Social impacts e.g. disruption of traffic and businesses	1: Low 4: High	More impact with construction of two structures	3	Less impact with construction of only one	2
Technical					
Construction duration	1: Short 4: Long	Construction duration would be longer	3	Construction duration would be shorter	2
Better mobility	1: High 4: low	The two underpasses would link the two separated portions of the road hence improved mobility	1	Less mobility	3

Parameters	**Score definition**	**Road Classification**			
		Option 1: Upgrade of underpass at Queens way and at railway line		**Option 2: Upgrade of only the underpass at the railway line**	
		Details	**Score**	**Details**	**Score**
Financial (Cost of construction)	1: Low 4: High	More expensive yet development of the proposed BRT route on Queen's Way will render the improvement useless resulting in fruitless and wasted expense	3	Less expensive	1
Total score			**13**		**10**

As per the score table above, Option 2: Upgrade of only the underpass at the railway line with the least total score is the recommended option and is proposed for implementation.

4.2.9 Design options for the upgrade of Kayemba Road

A number of design options have been proposed for the upgrade of Kayemba road. The establishment of the design options is based on the existing conditions of the road listed below and depicted in Plate18, 19, and 20 below.

- Close Proximity of building structures east of the railway line;

Plate 18: Structures east of railway line

- Close Proximity of building structures west of Queens way;

Plate 19: Structures west of Queens way

- 132Kv Transmission Line, which is located between the two existing underpass structures;

Plate 20: The railway embankment on the right, the 132kV Transmission line, and Queen's Way to the left

- The railway line is in use and it is required that there is no service interruptions during the construction period;
- Drainage of the structures during the post construction period;
- Close proximity of the two existing underpass structures to one another.

4.2.9.1 Design option 1: Re-grading Kayemba Road under the Rail Line and Queen's Way

This option considers a substantial re-grade of Kayemba Road. The Consultant proposed a

vertical clearance standard of 5.2m. This however meant very steep vertical grades in order to pass safely beneath the structures while adhering to the chosen clearance value. The vertical grades achieved by this option is in excess of 8.4% in both directions.

A low point is also created, and this low point would be some 4m below the natural ground. This low point also creates drainage problems. There is a drainage channel located immediately to the east of Queen's Way which drains northwards, but due to the flat longitudinal grade and surrounding areas, it would not be possible to connect the low point drainage to this existing channel.

This option will also require extensive retaining walls, with the effect of cutting off access to existing buildings. This is not desirable, as the property owners will have to be compensated and the buildings demolished. Access from Queen's Way into the western portion of Kayemba Road will also be lost.

4.2.9.2 Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way

This option is based on Option 1, as discussed in the previous paragraph. The proposed vertical clearance standard of 5.2m is reduced to 3.5m.

It was decided to reduce this clearance value to 3.5m since the highest vehicle to be catered for along Kayemba Road is trucks with gross weight of no more than 3 tons. This reduction has the effect of significantly improving the vertical grades that will be achieved along the re-graded section of Kayemba Road.

It will be possible to drain the low point that is created to the drainage channel located immediately to the east of Queen's Way. Drainage will be by kerb inlet, and a 1200mm diameter storm water line that will replace the drainage channel up to the point of outlet.

This option will also require cut retaining walls, but only locally to protect buildings and side roads. Access to existing businesses will be less affected, however access from Queen's Way into the western portion of Kayemba Road will still be lost.

4.2.9.3 Design option 3: Re-grade Kayemba Road over the railway line and Queen's Way

This option entails the re-grading of Kayemba Road over the rail line, as well as over Queen's Way. This option is not considered to be viable due to the following:

- Very steep approach gradients;
- Retaining walls will be required, which will cut off access to the local businesses, as well as negatively affecting mobility in the vicinity;
- Inadequate clearance between the 132kV Transmission lines and the road surface.
- The overpass structure that will be required is also much bigger, and therefore more expensive.

4.2.9.4 Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way

This option was considered to provide an at-grade crossing with the rail line as well as an at grade intersection with Queens Way. The existing left-in left-out access configuration from Queen's Way into Kayemba Road will remain.

This option is not considered to be viable due to the following:

- The development of the proposed BRT route on Queen's Way will render the at-grade intersection layout unusable, resulting in fruitless and wasted expense;
- At-grade rail crossings are considered dangerous as road users in Kampala are not known to adhere to the road rules regarding level rail crossings.

The 4 design options for Kayemba Road are scored as presented in Table 39 below.

Table 39: Analysis of Kayemba Road design alternatives

Parameters	Score definition	Design option							
		Design option 1: Re-grading Kayemba Road under the Rail Line and Queen's Way		**Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way**		**Design option 3: Re-grade Kayemba Road over the railway line and Queen's Way**		**Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**	**Details**	**Score**
Environmental impact									
Creation drainage problems	1: Low/none 4: High	A low point is also created that would create drainage problems that cannot be resolved with the current infrastructure	**4**	It will be possible to drain the low point that is created to the drainage channel located immediately to the east of Queen's Way.	1	No drainage problems created	1	No drainage problems created	1
Social impact									
Loss of access to buildings and local businesses	1: Low/none 4: High	Requires extensive retaining walls, with the effect of cutting off	4	Requires minimal cut retaining walls hence access to existing	2	Requires extensive retaining walls, with the effect of cutting off access	4		1

Parameters	Score definition	Design option							
		Design option 1: Re-grading Kayemba Road under the Rail Line and Queen's Way		**Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way**		**Design option 3: Re-grade Kayemba Road over the railway line and Queen's Way**		**Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**	**Details**	**Score**
		access to existing buildings.		businesses will be less affected		to existing buildings and negatively affecting mobility in the vicinity;			
Destruction of property	1: Low/none 4: High	Will be high with the construction of the extensive retaining walls	4	Will be reduced with less retaining walls	2	Will be high with the construction of the extensive retaining walls	4		1
Loss of access from Queen's Way into the western portion of Kayemba Road	1: Low/none 4: High	Access will totally be lost	4	Access will totally be lost	4		1	The existing left-in left-out access configuration from Queen's Way into Kayemba Road will remain.	1
Accidents to road users	1: Low 4: High	Minimal	1	Minimal	1	Minimal	1	At-grade rail crossings are considered	4

Parameters	**Score definition**	**Design option**							
		Design option 1: Re-grading Kayemba Road under the Rail Line and Queen's Way		**Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way**		**Design option 3: Re-grade Kayemba Road over the railway line and Queen's Way**		**Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**	**Details**	**Score**
								dangerous as road users in Kampala are not known to adhere to the road rules regarding level rail crossings.	
Technical									
Vertical grades	1: Low 4: High	The vertical grades achieved by this option is in excess of 8.4% in both directions.	4	Improved vertical grades with reduction value from option's one 5.2 to 3.5	3	Very steep approach gradients	4		1
Clearance between the 132kV Transmission lines and the road surface.	1: Adequate 4: Inadequate	Adequate clearance	1	Adequate clearance	1	Inadequate clearance	4		1
-									

Parameters	Score definition	Design option							
		Design option 1: Re-grading Kayemba Road under the Rail Line and Queen's Way		Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way		Design option 3: Re-grade Kayemba Road over the railway line and Queen's Way		Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on Queen's Way	
		Details	Score	Details	Score	Details	Score	Details	Score
Financial									
Financial (Cost of construction)	1: Low 4: High	Very expensive due high construction and compensation costs	3	Reduced costs due to reduced compensation and construction costs	2	The overpass structure that will be required is much bigger, and therefore more expensive	4		2
Financial loss	1: Low/none 4: High		1		1		1	The development of the proposed BRT route on Queen's Way will render the at-grade intersection layout unusable, resulting in fruitless and wasted expense	4
Total score			**26**		**17**		**25**		**16**

As per the score table above, Design option 4: Re-grade Kayemba Road to form an at-grade rail crossing and at-grade intersection on

Queen's Way with the least total score is the recommended option. However as mentioned earlier the option was not considered to be viable due to the following:

- The development of the proposed BRT route on Queen's Way will render the at-grade intersection layout unusable, resulting in fruitless and wasted expense;
- At-grade rail crossings are considered dangerous as road users in Kampala are not known to adhere to the road rules regarding level rail crossings.

The next best option as per the score table above and which would not result into fruitless and wasted expenses and is less dangerous to road users compared to the recommended option is Design option 2: Re-grading Kayemba Road under the Rail Line and Queen's Way and is the option proposed for implementation.

4.2.10 Bridge design options

Two existing road bridge structures are to be upgraded under the project, the one on Kayemba presented above and the one on New Port bell road. These existing structures are all in very poor conditions. They are also inadequate for use in the upgraded road scheme, thus they need to be reconstructed.

4.2.10.1 Bridge structure at New Port Bell Road

There are two options for the bridge structures to be constructed on Port bell road;

i. Portal structure
ii. Precast Beam and Slab Structure

The options are based on the following factors;

- Limitations placed upon occupation of the Railway lines by the URC;

The railway line is active, but not used frequently. The URC is planning to utilise the railway line for a passenger service in the future, so the railway line will not be closed in future. There is also advanced plans for a Standard Gauge Railway line 15m to the east of the existing railway line although allowance will not be made for this railway line under the proposed project

- Accommodation of traffic during the construction period;
- Upgrades to and new railway lines planned by the URC;
- Close proximity of other structures;
- Existing soil conditions.

Portal structure

It was considered to upgrade the overpass structure on Port Bell Road to a portal type structure, but considering the limitations on occupation of the railway line and accommodation of traffic, it cannot be considered. It will be difficult to construct the structure in half-widths. This option is also not suited to the required foundation solution, this being friction piles.

Precast Beam and Slab Structure

The structure will be designed with a precast beam and slab solution. This will enable the structure to be constructed in half-widths to suit the accommodation of traffic. It will also allow the railway line to remain open, only requiring occupation when the beams need to be placed. This can be done in a day, which will conform to URC requirements. The required structure abutments can be built without impacting on the railway line or Port Bell Road. This will also suit the foundation solution well. This is the recommended option proposed for implementation.

The two Port bell road bridge structure design options are scored as presented in Table 40 below.

Table 40: Analysis of New Port bell road bridge structure design alternatives

Parameters	**Score definition**	**Road Classification**			
		Option 1: Portal structure		**Option 2: Precast Beam and Slab Structure**	
		Details	**Score**	**Details**	**Score**
Environmental impact	NA	NA	NA	NA	NA
Social impact					
-Disruption of traffic including railway line	1: Low 4: High	High due to difficulty in construction of the structure in half-widths	4	Structure can easily be constructed in half-widths to suit the accommodation of traffic and allow the railway line to remain open, only requiring occupation when the beams need to be placed	1
Technical					
Compliance with Developer's requirements	1: High 4: Low/ none	Not suited to the required foundation solution, this being friction piles.	4	Suits the foundation solution well	1
Financial (Cost of construction)	1: Low 4: High	NA	NA	NA	NA
Total score			**8**		**2**

As per the score table above, "Option 2: Precast Beam and Slab Structure" with the least total score is the recommended option and is selected for implementation.

4.2.10.2 Bridge structure at Kayemba Road

There are three options for the bridge structures to be constructed on Kayemba road

i. Portal structure (Option 1)
ii. Portal structure (Option 2)
iii. Portal structure (Option 3**)**

The options are based on the following factors;

- Limitations placed upon occupation of the Railway lines by the URC;

The railway line is active, but not used frequently. It is currently serving only the locomotive workshop located in Kabuusu. The URC is planning to utilise the railway line for the Standard Gauge Railway line. This will be implemented in a future phase by the URC.

- Accommodation of traffic during the construction period;
- Upgrades to and new railway lines planned by the URC;
- Close proximity of other structures;
- Existing soil conditions.

Portal structure (Option 1)

This option will require that the railway line be occupied for a long period. This is not acceptable to the URC. It was considered to construct the portal structure on the side of the railway line and to jack the structure into position, but this is not feasible due to the fact that the railway line formation will be directly on top of the structure, leaving the railway line unable to support itself during the jacking process. This option is therefore not feasible.

Portal structure (Option 2)

This option will require that the railway line be relocated to a new position next to the existing position. It will be easy to relocate due to the fact that the structure is situated in a horizontal curve in the railway alignment. The horizontal curve radius can then simply be enlarged.

A temporary portal structure will be built next to the existing structure, after which the railway line will be relocated to this structure. The existing structure can then be safely demolished. Then the new portal structure will be constructed, and when it is finished will the railway line be put back in its place. After that the temporary portal structure will be demolished.

This option is not feasible due to the fruitless expense of constructing a temporary structure that will be demolished afterwards. It must be mentioned that the URC is not averse to this option.

Portal structure (Option 3)

This option is based on Option 2. A portal structure will be designed to be built in two halves. The first half will be built in position, after which the railway line will be relocated to this portion of the structure. The existing structure can then be safely demolished. Then the second half of the portal structure will be constructed, and when it is finished will the railway line be put back in its place. This will leave the Client in the position of being able to have a structure wide enough for future upgrades to the railway line without the travelling public having to endure the accommodation of traffic required to enlarge the current portal structure. This option is the recommended option proposed for implementation.

The three design options for the structure at Kayemba road are scored as presented in Table 41 below.

Table 41: Analysis of New Port bell road bridge structure design alternatives

Parameters	**Score definition**	**Kayemba bridge structure design Options**					
		Portal structure (Option 1)		**Portal structure (Option 2)**		**Portal structure (Option 3)**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**
Environmental impact	NA	NA	NA	NA	NA	NA	NA
Social impact							
Interruption with railway operations	1: Low/none 4: High	Requires that the railway line be occupied for a long period.	4	Minimal /no interruption since railway line will be temporarily relocated to a temporary structure	1	Minimal /no interruption since railway line will be temporarily relocated to the first half of the portal structure	1
Technical							
Complexity of construction	1: Easy to construct 4: Difficulty to construct	Easy to construct since there would be no need for relocation of railway	1	Easy to relocate railway to new temporary structure	1	Easy to construct	1
Financial (Cost of construction)	1: Low 4: High	No extra costs	2	Increased costs from construction of temporary structure to house the railway line	3	No extra costs	2

Parameters	**Score definition**	**Kayemba bridge structure design Options**					
		Portal structure (Option 1)		**Portal structure (Option 2)**		**Portal structure (Option 3)**	
		Details	**Score**	**Details**	**Score**	**Details**	**Score**
Total score			**7**		**5**		**3**

As per the score table above, "**Option 3** with the least total score is recommended was proposed by the design engineer for implementation in consultation with Uganda Railway Corporation (URC) (Appendix XVI).

4.2.11 Road lighting design options

Solar powered lighting and hybrid-powered system is to be used for the project roads. The battery box housing is to be manufactured from powder-coated corrosion proof 3CR12 steel and shall be of suitable size to house the regulator and battery. Two options have been provided for positioning of the solar battery box housing;

i. Underneath the solar module

The battery box housing shall be positioned underneath the solar module to prevent direct sunlight heating up the batteries inside the battery box. Furthermore a sun- shield is fitted to the battery box to prevent the rising and setting sun to heat up the battery enclosure. Additional mechanical design features, like recessed screw head provisions, shall be fitted to discourage vandalism and/or theft. It shall be designed in such a way to allow the correct orientation on site. The mounting angle of the solar module shall be designed to set the required inclination level (this shall be a minimum of 5° from the horizontal).

ii. Underground

An option of mounting/installing the battery boxes underground was thoroughly investigated. It was found that locating the battery boxes underground cannot be recommended due to the following factors:

- The heat generated cannot be dispersed adequately;
- Ingress of moisture from rain as well as condensation cannot be 100% prevented;
- Dust and other detritus cannot be kept out of the enclosure. Both the excess heat and moisture will shorten the life span considerably.

The two options for positioning of the solar battery box housing are scored as presented in Table 42 below.

Table 42: Analysis of alternatives for positioning of the solar battery box housing

Parameters	**Score definition**	**Road Classification**			
		Option 1: Underneath the solar module		**Option 2:** Underground	
		Details	**Score**	**Details**	**Score**
Environmental impact	NA	NA	NA	NA	NA
Social impact	NA	NA	NA	NA	NA
Technical					
Adequate heat dispersal	1: High heat dispersal 4: Low heat dispersal	Adequate heat dispersal	1	The heat generated cannot be dispersed adequately	4
Prevention moisture ingress and condensation	1: High 4: Low		1	Ingress of moisture from rain as well as condensation cannot be 100% prevented	4
Prevention of dust ingress	1: High 4: Low		1	Dust and other detritus cannot be kept out of the enclosure.	4
Life span	1: Long 4: Short	Long because of low moisture and dust ingress into box	1	Both the excess heat and moisture will shorten the life span considerably.	3
Financial (Cost of construction)	1: Low 4: High	NA	NA	NA	NA
Total score			**4**		**15**

As per the score table above, "Option 1: Underneath the solar module" for positioning of the battery box with the least total score is the recommended option. However "Option 2: Underground" is selected for implementation to discourage vandalism/theft. Provisions to reduce the disadvantages of underground vis a vis underneath the solar module have been made (SMEC, 2016)

5. CHAPTER FIVE: REVIEW OF LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter describes legislation of Uganda that in one way or the other will be relevant to the proposed mobility improvement project. Relevant institutional framework and environmental and social requirements for the World Bank is also highlighted. The chapter also discusses international conventions to which Uganda is a signatory and which may be relevant to the project.

5.1 Policy Frame work

5.1.1 The National Environment Management Policy, 1994

The National Environment Management Policy for Uganda seeks to meet the following objectives:

i. Enhance the health and quality of life of all people in Uganda and promote long-term, sustainable socio-economic development through sound environmental and natural resource management and use;
ii. Integrate environmental concerns in all development policies, planning and activities at national, district and local levels, with full participation of the people;
iii. Conserve, preserve and restore ecosystems and maintain ecological processes and life support systems, especially conservation of national biological diversity;
iv. Optimize resource use and achieve a sustainable level of resource consumption;
v. Raise public awareness to understand and appreciate linkages between environment and development; and
vi. Ensure individual and community participation in environmental improvement activities.

Relevance: The policy generally requires that projects or policies likely to have significant adverse ecological or social impacts undertake an ESIA before their implementation. It is against this backdrop that this ESIA has been undertaken for the proposed project.

5.1.2 The National Water Policy, 1999

The National Water Policy seeks to manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs of the present and future generations with full participation of the stakeholders.

Relevance: There are some water resources by some of the project roads hence the relevancy of the policy. The ESIA being carried out for the project will aid in achieving the goal of the national water policy.

5.1.3 The Policy on Conservation and Management of Wetland Resources, 1995

Wetlands are ecologically sensitive areas habouring a lot of aquatic macro and micro biota and play critical ecosystem functions such as flood control and ground water recharge. However, these benefits are in jeopardy due to poor management practices of wetlands. The Government of Uganda adopted a National Policy for the Conservation and Management of Wetland Resources to promote the conservation of wetlands in order to sustain their values for present and future well-being of the people.

Relevance: There are some degraded wetlands by some of the project roads that are likely to be degraded further by the project activities. One of the strategies of the Conservation and Management of Wetland Resources policy is to carry out Environmental Impact Assessment on planned developments that are likely to impact on wetlands as is the case in this project.

5.1.4 Wildlife Policy, 1999

The Uganda Wildlife Policy (revised from the one of 1996) aims to conserve in perpetuity, the rich biological diversity and natural habitats of Uganda, in a manner that accommodates the development needs of the nation, and the well-being of its people and the global community.

Relevance: Some project roads cut across natural habitats in particular swamps and a stream which the developer should conserve in line with this policy.

5.1.5 Uganda Gender Policy, 2007

The policy provides a legitimate point of reference for addressing gender inequalities at all levels of government and by all stakeholders. The major intended achievements of this policy include among others;

- Increased awareness on gender as a development concern among policy makers and implementers at all levels;
- Influencing national, sectoral and local government programmes to address gender issues;
- Strengthened partnerships for the advancement of gender equality and women's empowerment and increased impetus in gender activism.

Relevance: To abide by the policy, the project developer or contractor is expected to take gender issues into account during the implementation of the project especially at employee recruitment stage.

5.1.6 Land Use Policy

The overall goal for the national land use policy is to achieve sustainable and equitable socio-economic development through optimal land management and utilization. The specific goals of this policy include ensuring adequately planned land use systems that provide for orderly and sustainable urbanization, industrial and infrastructural development; adopt improved agriculture and other land use systems that will provide lasting benefits for Uganda; to reverse and alleviate adverse environmental effects at local, national, regional and global levels; to promote land use activities that ensure sustainable utilization and management of environmental, natural and cultural resources for national socio-economic development; to ensure planned, environmentally friendly, affordable and well-distributed human settlements for both rural and urban areas; and to update and harmonize all land use policies and laws and strengthen institutional capacity at all levels of the Government.

The policy has 33 policy statements ranging from making available, on regular basis, land use/land cover data which is of sufficient detail and effectively disaggregated to enhancing implementation of regional and international conventions and other protocols to which Uganda is (or will be) a signatory and in compliance with national laws, policies, regulations and guidelines. The need for an integrated approach towards land use planning is highlighted. The coordination of activities of all stakeholders in land use planning is emphasized. In particular the involvement of land owners, community groups, women, youth and the poor in making land use related decisions that affect them is regarded as being critical in the successful implementation of the policy.

Relevance: Considering that land is to be acquired for the roads to be expanded, the developer is expected to consult the local community about the project and abide by other clauses in this policy.

5.1.7 The National AIDS Policy (2004)

This provides overall policy framework for national HIV/AIDS response. The National Policy on HIV/AIDS recognizes special groups, which include migrant workers. The Policy recommends the need to identify strategies to address migrant workers in view of the challenges posed by mobility and vulnerability to HIV. This is in line with the Constitution of the Republic of Uganda, 1995 Article 39. This Article creates the right to a clean and healthy environment, implying that workplace safety and health (including prevention of HIV infection), is a basic right of every citizen. Under its General Objective XIV, the State is committed to fulfilling the fundamental rights of all Ugandans to, among others, social justice and economic development and shall, in particular, ensure that all developmental efforts are directed at ensuring the maximum social and cultural well-being of the people.

Relevance: The workers who may come from outside the project area during implementation of the proposed project and the community are likely to be exposed to the spread of HIV/AIDS. The strategies to fulfil the objective of this policy will need to be incorporated in the project during the planning process.

5.1.8 National HIV/AIDS Policy and National Strategic Plan (NSP) 2015/16 – 2019/20

The Uganda National HIV/AIDS Policy (2004) requires all Government Ministries to develop specific policies for guiding the process of mainstreaming HIV/AIDS activities in respective sectors. Ministry of Works and Transport (MoWT) developed the HIV/AIDS policy for the road sector based on the premise that whereas some road-sector activities have been proved to be major conduits for transmission of HIV/AIDS, others directly and indirectly contribute to the fight against the pandemic. For instance, good roads and transport services can be used to enhance access to HIV/AIDS prevention services and care. On the other hand, some sector activities and good road networks have proved to be a conduit for increased spread of the pandemic and examples include prostitution associated with long-distance truck drivers and road construction works. The goal of this is to guide mainstreaming of HIV/AIDS activities so as to reduce prevalence of HIV infection, provide care and support to infected and affected persons and to mitigate effects of HIV/AIDS in the sub-sector. Specific objectives of the policy are to: Reduce vulnerability and risk of HIV transmission in the roads sub-sector; Mitigate effects of HIV/AIDS in the roads sub-sector; and Improve road sector's capacity to respond to HIV/AIDS pandemic.

The Vision of the National Strategic Plan (NSP) 2015/16 – 2019/20 is "A Healthy and Productive Population free of HIV and AIDS and its effects" while the Goal is "Towards Zero new infections, Zero HIV and AIDS-related mortality and morbidity and Zero discrimination". To attain the goal of this NSP, it will be implemented under four thematic areas, namely, Prevention, Care and Treatment, Social Support and Protection, and Systems Strengthening. The goal of the prevention thematic areas is to reduce the number of youth and adult infection by 70% and the number of new pediatric HIV infection by 95% by 2020. Care and Treatment thematic area is aimed to decrease HIV associated morbidity and mortality by 70% through achieving and maintaining 90% viral suppression by 2020. Social Support and Protection thematic area is aimed to reduce vulnerability to HIV and AIDS and mitigation of its impact on PLHIV and other vulnerable groups by, among others, scaling-up efforts to eliminate stigma and discrimination.

Relevance: The policy is relevant because AIDS is real in all parts of Uganda and it implies that the project implementers should put in plan measures to reduce HIV/AIDS spread during the construction period.

5.1.9 Transport Sector Policy

The Transport Sector Policy aims at providing strategic support and linkage to the Government declared Poverty Eradication Action Plan (PEAP) under Pillar II that seeks to enhance production. One of the policy implications of PEAP is to remove constraints from agricultural sector where the most poor are self-employed. One of the ways of removing constraints is improving transport.

Furthermore, to give transport modal linkage, the sub-sector has four supplementary policies of which one is on environment which provides that, the government will ensure an optimum and sustainable road network and bridge stock that balances traffic needs against safety and environmental demands.

Relevance: The proposed project is aimed at improving mobility in Kampala that has markets for most agricultural products and hence already in support of the transport sector Policy.

5.1.10 Uganda Road Sector Policy Statements, Guidelines

5.1.10.1 MoWT Guidelines for Mainstreaming Cross-Cutting Issues, 2008

Ministry of Works & Transport (MoWT) has in place guidelines for mainstreaming concerns and interventions for cross-cutting issues into its activities, plans and programmes. The sub-sector cross-cutting issues include: Gender, Occupational Health and Safety, People with Disabilities and the Elderly concerns and HIV/AIDS. The guidelines provide guidance on strategies, methods and responsibilities for mainstreaming crosscutting issues in road infrastructure projects.

Relevance: The developer is expected to make reference to the guidance contained therein to mainstream the cross cutting issues into the proposed project.

5.1.10.2 MoWT General Specifications for Road and Bridge Works, 2005

MoWT developed general specifications for Road and bridge works which detail how contractors undertaking road and bridge works ought to address, amongst others, cross-cutting issues (gender, environment HIV/AIDS and OSH). The guidelines give practical mitigation measures to be integrated into road designs and implemented during construction and operation.

Relevance: The developer is expected to integrate the proposed measures into the design for the project and implement the measures during the implementation of the project.

5.1.10.3 The Uganda National Culture Policy 2006

This Policy has been formulated to guide the formal and informal systems of managing culture at all levels. The aim of this policy is to promote aspects of Uganda's cultural heritage that are cherished by its people. The policy recognizes both natural and man-made cultural heritage resources that collectively Ugandan's heritage. Sites, monuments and antiquities are important for socio-cultural and educational purposes. Cultural beliefs, traditions and values are core to a community's mechanism for survival. This policy sets guidelines to enhance the appreciation of these cultural values and to mitigate social practices that are oppressive to people. It therefore provides a framework and calls all stakeholders to operate within this framework to ensure the development of culture for sustainable development.

5.1.10.4 EIA Guidelines for Road Sub-Sector, 2008

EIA Guidelines for the road sector were finalized by MoWT in 2008 and outline sector-specific socio-environmental assessment requirements for road projects. They categorize various road projects and levels of EIA to be undertaken depending on scale of the road project.

5.2 Legal Frame Work

5.2.1 The Constitution of the Republic of Uganda

The Constitution of the Republic of Uganda 1995 has a number of articles concerning protection of natural resources. In Article XIII: "the obligation of protecting important natural resources on behalf of the people of Uganda" is vested with the state. Article XXVII stipulates the need for sustainable management of land, air and water resources, Article 237 on Land ownership provides that Land in Uganda belongs to the citizens of Uganda and shall vest in them in accordance with the land tenure systems provided for in this Constitution. Article 242 highlights land use in which Government may, under laws made by Parliament and policies made from time to time, regulate the use of land while Article 245 among others concerns protection and preservation of the environment from abuse, pollution and degradation as well as managing the environment for sustainable development and promoting environmental awareness. Furthermore, under article 26 on protection from deprivation of property, the Constitution gives a right to every person to own property either individually or in association with others (1). Section 2 of this article stipulates that no "person shall be compulsorily deprived of property or any interest in or right over property of any description except where the following conditions are satisfied- taking of possession or acquisition in necessary for public use or in the interest of defense, public safety,

public order, public morality or public health; and the compulsory taking of possession or acquisition of property is made under a law which makes provision for- prompt payment of fair and adequate compensation, prior to the taking of possession or acquisition of the property; and a right of access to a court of law by any person who has an interest or right over the property.

In regard to labour issues, the Constitution of Uganda, Section 40 recognizes the right to equal pay for work of equal value. The Constitution Article 21 also states that all human beings are equal before the law and no person can be discriminated against on any ground including sex, race, colour, ethnic origin, tribe, birth, creed or religion, social or economic standing, political opinion or disability.

The Constitution of Uganda Article 40 further notes that women can work in the same industries as men. No restrictions could be located in laws as quoted "every person in Uganda has the right to practise his or her profession and to carry on any lawful occupation, trade or business".

The construction activities of the different roads will require labor force. The Contractor will be required to comply with the above regulations to avoid any kind of discrimination at the work place.

Relevance: The proposed project will affect land privately owned, structures and other properties especially with regard to roads that are to be dualled. The construction activities of the different roads will also require labor force hence the developer is expected to heed to the requirements of the constitution.

5.2.2 The National Environment Act, Cap 153

The National Environment Act, Cap 153 contains provisions for environmental management and protection including the need to carry out an Environmental Impact Assessment (EIA) studies in connection with some categories of projects that are likely to have significant impacts on the environment as contained in its Third Schedule.

Relevance: Transportation projects under which the proposed project would fall are listed under this category and are therefore required to be preceded by EIA.

5.2.3 The Water Act Cap 152, 1995

According to Part II (Water Resources) of Water Act, the Minister and the Director are responsible for the implementation of this Act which provides for the use, protection and management of water resources and supply. Part I Section 4(1) of the Act spells out the objectives which include the coordination of all public and private activities which may influence

the quality, quantity, distribution, use or management of water resources. Part I Section 6 (1) stipulates that notwithstanding any other law to the contrary; no person shall acquire or have a right to:

(a) Use any water
(b) Construct or operate any works; or
(c) Cause or allow any waste to come into contact whether directly or indirectly with any water, other than under the provision of this Part of the Act.

Relevance: The Act is relevant in water abstraction for the road-works and it requires the contractor to apply for the water abstraction permit. There are springs along Sentema, Wamala and Old Mubende roads some of which are quite close to the road. This Act will therefore be relevant to this project to allow for the orderly development and use of water resources

5.2.4 Mining Act, 2003

The Uganda Geological Survey and Mines Department is responsible for the implementation of the Mining Act, 9/2003 which establishes the framework for the utilization of mineral resources in Uganda. The Commissioner in charge of mining is responsible for granting of licenses for prospecting and exploration of minerals as stipulated in Section 19, 20 and 27 of the Act. A mining license is required in order to mine any mineral. Application and granting of a mining lease is also provided for in Section 40, 41 and 42 of the same Act. Section 14 (2) provides for the health and safety of persons employed in the mine while the rights of owners or lawful occupiers of land on which the powers of the Commissioner are exercised for prospecting, exploration are also preserved under Section 14 (3) of this Act .

Section 82 of the Act entitles the owner or lawful occupier of any land subject to a mineral right to claim fair and reasonable compensation from the holder of such mineral right for any disturbance of the rights of such owner or occupier, or for any damage done to the surface of any such land as a result of the mineral holder's operations.

Part XI of the Act, incorporating Sections 108 to 112, on the other hand, contains provisions relating to the protection of the environment in accordance with the requirements of the National Environment Act, Cap 153. This part, inter alia, requires the Commissioner or an authorized officer, in deciding whether to grant a mineral right, to take into account the need to conserve the natural resources in or on the land over which such mineral right is sought, and in any neighboring or adjoining lands, requires the Commissioner to request for an Environmental Impact Study as a condition for granting a mining lease; and provides for the restoration and/or rehabilitation of damaged areas.

Part XII of the Act, incorporating Section 113 to 121 of the Act, deals with important miscellaneous matters, such as the right of women to work or be employed underground in a mine or any operations or activities relating to or associated with mining.

Relevance: There will be need for stones, gravel and other road construction minerals especially for expansion of roads which will be sourced from quarries and sites yet to be identified. As such the developer or contractor for the project will have to abide with the provisions under this Act.

5.2.5 Land Act, Cap 227

The Land Act provides for the ownership and management of land and dispute resolution. Subject to Article 237 of the Constitution, all land in Uganda is vested in the citizens of Uganda and is owned in accordance with the customary, freehold, mailo and leasehold land tenure systems. The land law provides security of tenure to customary and bonafide occupants which is likely to strengthen their interests in conserving the land as a resource. Section 30 defines lawful and bonafide[1] occupancy and use of land which may be registered (freehold, mailo, lease or sub-lease).

Under the Land Act, all owners and occupiers of land are to manage it in accordance with National Forestry and Tree Planting Act Cap 8/2003, Mining Act Cap 9/2003, National Environment Act, the Water Act Cap 152, Uganda Wildlife Act Cap 200, the Town and Country Planning Act and any other relevant law.

It creates a series of land administration institutions (Section 47-74) consisting of Uganda Land Commission (ULC), District Land Boards (DLB). Section 42 (7a-e) states the procedures for any compulsory acquisition of land by the Land Commission while Acquisition of land by Government or Local authority for public use is provided for under Section 43.

The Act gives valuation principles for compensation under Section 60 (1) while Section 78 requires compensation rates to be yearly approved by DLBs. The Value for customary land is the open market value, the value for buildings on land taken shall be the replacement cost in rural areas whereas 30% and 15% (of total sum assessed) disturbance allowance is to be paid if less than six months or six months' notice respectively is given for vacating the land.

[1] Land occupied and utilised for 12 years or more before the 1995 Constitution, unchallenged by the registered owner

Relevance: Land will have to be acquired for implementation of the project especially with regard to roads to be expanded. As such the developer will have to abide by the procedures and methods of land acquisition provided in the Land Act.

5.2.6 The Survey Act 1964

Before any attempts are made to construct any road in any part of the country, a survey of the area has to be carried out. Survey operations in Uganda are governed by The Survey Act.

Under this Act, the commissioner of Surveys can authorize the carrying out of a survey of any land if it is necessary. However, where a general survey is necessary, notice of such specifying the local limits of the area affected has to be published in the gazette before the survey is undertaken. In case the survey is of a special nature, which could be outside the capacity and scope of the commissioner, then the minister may order for such a survey. In that case, the minister must specify the nature of the survey to be carried out and its purpose. The minister is compelled to comply with the provisions of the Act when doing so.

Only government surveyors or duly authorized officers with servants and workmen may enter upon any land and make all or any inquiries and do or cause to be done all things necessary for effecting such a survey.

Obstructing a surveyor when he is carrying out lawful activities is an offence under this Act. However, in all cases, notice must always be given to the party to be affected by the survey.

With regard to compensation the Act stipulates as follows;

"Where any demand for compensation is made as a result of the clearance of any boundary or other line , a Government surveyor shall, as soon as conveniently may be, inspect any trees, fences, or standing crops which are alleged to have been cut down or damaged, and , if he or she shall consider that any compensation should be paid, shall pay or tender to the owner of the trees, fences or standing crops the amount of compensation which in his or her opinion should be allowed for them". The project will involve construction of access roads making this Act relevant.

Relevance: The proposed project will involve road survey geared towards the development of the project design. It will also involve acquisition of land that shall need surveying and demarcation.

5.2.7 The Roads Act, 1964

Section 3 of the Roads Act declares a road reserve as an area bound by imaginary lines parallel at a distance of no more than fifty feet (15.2m) from the Centre line of any road. For roads to be dualled, a road reserve will have to be acquired. The Act prohibits erection of any building or planting of any tree or permanent crops within the road reserve except with a written permission of the Authority. Any person who commits this offence will have the Authority write a notice to him requiring him to pull down buildings, cut down /uproot trees or crops, alter road entrance or close the means of access (section 6). The Act allows a road authority to dig and take away materials required for the construction and maintenance of roads in any part of a road reserve approved by the District Commissioner without payment to any person.

Relevance: Road reserves will need to be acquired under this project particularly for roads that are to be dualled, therefore the Act will be be applicable once the road reserves are acquired.

5.2.8 The Access to Roads Act, 1965

The Access to Roads Act seeks to ensure that a private land owner who has no reasonable means of access to public highway may apply for leave to construct a road of access to a public high way. The law establishes a mechanism for applying for such a road. It also establishes a legal regime to ensure the safety of the neighbouring environment.

The Act permits the owner of any land who is unable through negotiations to obtain leave from adjoining land owners to construct a road of access to the public highway, to apply to a magistrate for leave to construct a road of access over any land lying between his land and the public highway. The law also provides for means by which an order for the construction of an access road can be invoked. The Act further provides for maintenance of the access road in a good and efficient state of repair, and for payment of compensation by the applicant in respect of the use of land, the destruction of crops or trees and such other property.

Relevance: This Act is applicable to the proposed project considering that access roads will have to be constructed to access the different project facilities.

5.2.9 The Land Acquisition Act, 1965

This Act makes provision for the procedures and methods of compulsory acquisition of land for public purposes whether for temporary or permanent use. The Minister responsible for land may authorize any person to enter the land, survey the land, dig or bore the subsoil or any other thing necessary for ascertaining whether the land is suitable for a public purpose. The Government or developer is to compensate any person who suffers damage as a result. The Act requires that

adequate, fair and prompt compensation is paid before taking possession of land and property. Dispute arising from the compensation to be paid should be referred to the court for decision if the Land Tribunal cannot handle.

Relevance: Land will have to be acquired for implementation of the project especially with regard to roads to be expanded. As such the developer will have to abide by the procedures and methods of land acquisition provided in the Act.

5.2.10 The Historical and Monuments Act, 1967

This is an Act to provide for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical and traditional interests and for other matters connected therewith. Section 1 of this Act describes these terms used above. Section 8 of this Act specifies actions that are prohibited. Section 11 stipulates that any discoveries of the objects made that are considered to be of importance according to this Act shall be reported to the conservator of antiquities or district commissioner or the curator of the museum within fourteen days. Any person who contravenes any of the conditions issued under this Act commits an offence and this attracts a fine as stipulated in Section 19 of this Act.

Relevance: During construction phase, the contractor may come across chance finds of cultural and archeological importance at new Rights of Way, borrow areas and quarries and thus will have to observe the requirements of the Act.

5.2.11 The Occupational Safety and Health Act, 2006

This is a two way Act that obliges employers to protect their workers and charges the employees to take responsibility of their safety while at work. The Act is concerned of not only the work area but also its immediate environment. According to section 13 (1)a of the Occupational Safety and Health Act, it is the responsibility of an employer to take as far as reasonably practicable, all measures for the protection of his or her workers and the general public from the dangerous aspects of the employer's undertaking at his or her own cost. Section 19 (2) further spells that it shall be the duty of an employer to ensure that Personal Protective Equipment provided under sub section (1) is used whenever it is required.

Relevance: This Act is of relevancy to the proposed project during its implementation to guarantee the safety of all the workers that will be involved in the project and even the surrounding community members of the respective villages.

5.2.12 The Workers Compensation Act, 2000

The Act provides for compensation of workers for injuries suffered and scheduled diseases incurred in the course of their employment. The Act further spells out degrees of compensation depending on the levels of incapacitation, calculation of respective earnings, medical examination and treatment of workers, agreement as to compensation by the worker, power of Court to submit question of law, determination of claims and decisions of the court concerning the treatment of medical reports as well as procedures relating to claims.

Relevance: Considering that all workers are prone to accidents, injury and diseases while at work, the contractor must adhere to the provisions of this Act.

5.2.13 Petroleum Act, Cap 149

According to Section 2 of the Act, petroleum shall not be imported, unloaded, landed, transshipped, or transported except in accordance with the provisions of the rules (Section 3) under this

Act. Any person who contravenes the rules specified in Section 3 commits an offence as described in Section 4-6. Penalty for contravention of these rules is provided for in Section 9 of this Act.

Relevance: During the construction phase of the project, a lot of fuel and other petroleum products are likely to be required to run machinery therefore bulk transport and storage in the project area is expected and this shall have to comply with the requirements of this Act.

5.2.14 The Petroleum Supply Act, 2003

This Act provides for supervision and monitoring the importation, export, transportation, processing, supply, storage, distribution and marketing of petroleum, for the safety and protection of public health and the environment in petroleum supply operations and installations.

Relevance: During project construction activities, a lot of fuel and other petroleum products are likely to be required. The Petroleum Supply Department is therefore a stakeholder for the project.

5.2.15 Explosives Act, Cap 298

The state owns all the rights to importation and storage of quarrying explosives and exercises this right through The Explosives Act (Cap 309 of the Laws of Uganda). It is mandatory for quarry operators to comply with this law. This Act regulates use and management of explosives for civil purposes. Under this Act, explosives are kept at a site approved by the Ministry of Internal

Affairs (MoIA) and can only be transported to the blast site under Police escort. Charging of explosives and blasting are carried out under Police supervision.

Relevance: For stone quarrying where explosives will be used the provisions of this Act will have to be abided with.

5.2.16 Local Governments Act, Cap 243

This Act provides the legal foundation of the Government Policy on decentralization and devolution of functions, powers, and services to Local Governments. Under this Act, district and lower local councils are given the responsibility of managing their natural resources including environment at the Local Government level. Natural Resources Committee is responsible for environmental issues at the district.

Relevance: In line with the Act, the local government of Wakiso District under which a few of the project roads fall was involved in scoping phase of the project and in actual ESIA studies as well as in issues of land acquisition, compensation and environmental monitoring and compliance.

5.2.17 The Public Health Act, 1964

Under this Act, the Minister may cause to be made such inquiries as he or she may see fit in relation to any matters concerning the public health in any place. When such a directive is made, the person directed to make the inquiry shall have free access to all books, plans, maps, documents and other things relevant to the inquiry and shall have in relation to witnesses and their examination and the production of documents, similar powers to those conferred upon commissioners by the Commissions of Inquiry Act, and may enter and inspect any building, premises or place, for the purpose of inquiry.

Relevance: For the construction of workers camps, the provisions of this Act will be relevant for its inspection and any other machinery and workers work conditions.

5.2.18 Employment Act No 6, 2006

Employment Act, 2006 repeals Employment Act, Cap 219 enacted in 2000. This Act is the principal legislation that seeks to harmonise relationships between employees and employers, protect workers' interests and welfare and safeguard their occupational health and safety through:

i) Prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV)
ii) Providing for labour inspection by the relevant ministry (Part III)
iii) Stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI)
iv) Continuity of employment such as continuous service, seasonal employment, etc. (Part VIII)

This law revises and consolidates laws governing individual employment relations and matters related to it. Similar to the Constitution, as earlier mentioned, it makes it an unlawful to discriminate people in employment. It defines discrimination as any distinction, exclusion or making preference on the basis of race , color , sex , and HIV status or disability amongst other which has the effect of nullifying or impairing the treatment of a person in employment or occupation or prevents an employee from obtaining any benefit under a contract of service.

Sexual harassment is one of the factors that put workers at the risk of HIV/AIDS. The Employment Act also makes it an offence for an employee's employers or their representative to make a request for sexual intercourse, contact or any other form of sexual activity either directly or indirectly that contains implied express promise for preferential treatment in employment, threat of detrimental treatment , threat about present or future employment status of the employee. They also commit an offence when they use a language whether written or spoken of a sexual nature, use visual material of a sexual nature or show physical behavior of a sexual nature which directly or indirectly subjects the employee to behavior that is unwelcome or offensive to that employee and that either by its nature or through repetition has detrimental effect on that employees employment , job performance or job satisfaction and exposes or makes the employee vulnerable to situation that expose him or her to HIV/AIDS and other STIs. The Employment Act also states that HIV status does not constitute fair reasons for dismissal or for the imposition of a disciplinary penalty.

Relevance: The Employment Act, therefore requires to be made known to the project contactors or their representatives and adhered with to promote a health working environment for all those employed. Workers welfare is one of the issues that requires to be regularly monitored by the lead agency or any other assigned agency.

5.2.19 The Penal Code Act

The Penal Code Act states that any person who intends to insult the modesty of any woman or girl, utters any word, makes any sound or gesture or exhibits any object, intending that such word or sound shall be heard, or that such gesture or object shall be seen by such woman or girl, or

intrudes upon the privacy of such woman or girl, commits a misdemeanour and is liable to imprisonment for one year.

It is also noted that an employer who has more than 25 employees is required to have in place measures that sexual harassment. A policy statement is issued stating that the workplace is free of sexual harassment. The policy statement must also describe the procedure through which worker may bring the complaints of sexual harassment to the attention of the Labour officer. The officer must keep confidential all the information related to the complainant except where disclosure is necessary for the purpose of investigation or taking disciplinary measures. Each worker should be well aware of the provisions of the policy statement.

Relevance: The project will employ some women and is expected to have more than 25 employees therefore the developer is expected to heed to the requirements of the Act.

5.2.20 The Children's Act, 1997 (CAP 59)

This Act refers to a child as a person under the age of 18 years with the right to stay with their parents or guardians; right to education and guidance; right to immunisation; right to adequate diet, clothing, shelter and medical attention. It is also the parent/guardian's responsibility to protect the child from discrimination, violence, abuse and neglect; and it is unlawful to subject a child to social or customary practices that are harmful to a child's health.

This Act also states that no child shall be employed or engaged in any activity that may be harmful to his/her health, education or mental, physical or moral development.
Relevance: There is an observed tendency for road projects to employ and over work children. The contractor will be required to comply with the Children's Act.

5.3 National Regulatory Frame work

5.3.1 National Environment (Noise Standards and Control) Regulations, 2003

Subject to these regulations, no person shall, for an activity specified under regulation 6, emit noise in excess of the permissible noise levels provided under the first schedule of the Regulations, unless permitted by a license issued under these regulations. Part III Section 8 (1) requires machinery operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible levels presented under the first schedule of the regulations. Those relevant to the project are presented under Tables 43, 44 and 45 below. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for 8 hours should be provided with requisite ear protection.

Table 43: Maximum permissible noise levels for impact or impulsive noise

Column 1	**Column 2**
Sound Level dB (A) (Lmax)	**Permitted number of impulses or impacts per day**
140	100
130	1,000
120	10,000

Table 44: Maximum permissible noise levels for construction site

Column 1	**Column 2**	
Facility (Leq) in dB (A)	**Maximum noise level permitted**	
	Day	**Night**
• Hospitals, schools, institutions of higher learning, homes for the disabled, etc.	60	50
• Buildings other than those prescribed in (i)	75	65
*Time frame: Day 6.00a.m -10.00 p.m.; Night 10.00 p.m. - 6.00 a.m.		

Table 45: Maximum Permissible noise levels for mines and quarries

Column 1		Column 2
	Facility	Limit Value in dB(C)
1	For any building used as a hospital, school, convalescent home, old age home or residential building	109dB (C)
2	For any building in an area used for residential and one or more of the following purposes: Commerce, small-scale production, entertainment, or any building used for the purpose of industry, commerce or small scale production	14dB (C)

Source: The National Environment (Noise Standards and Control) Regulations, 2003

Relevance: The project will be associated with some noise generating activities hence the regulations have to be adhered to.

5.3.2 The National Environment (Waste Management) Regulations, 1999

These regulations apply to all categories of hazardous and non-hazardous waste, storage and disposal of hazardous waste and their movement into and out of Uganda and to all waste disposal facilities, landfills, and sanitary fills and to incinerators.

The regulations also describe issues such as sorting and disposal of domestic waste, cleaner production methods, application for licenses for transportation and storage of waste, packaging of waste and powers of environmental inspector among others.

Relevance: The proposed road project is expected to generate waste of different types including concrete, plastics, polythene and oil waste. Handling of these wastes should be in accordance with these regulations.

5.3.3 The National Environment (Wetlands, River Banks and lakeshores Management) Regulation S.I No. 2/2000.

This regulation provides that any person carrying out a regulated activity as stipulated in the Second Schedule shall make an application to NEMA and obtain a permit. Second Schedule (8) lists construction of transport and communication facilities as one of the regulated activities that require a permit.

Relevance: Some wetlands will be affected by the construction such as Mugema road wetland and near wetland on Portbell road.

5.3.4 The National Environment (Minimum Standards for Discharge of Effluents into Water or Land) Regulations, 1999

Section 6 (2) details maximum permissible discharge limits for 54 contaminants, that must not be exceeded before effluent is discharged into water or on land. Through limits on over 54 pollutants, these regulations control discharges in surface watercourses. Examples of some of the regulated pollutants are given in Table 46.

Table 46: National discharge standards for selected pollutants

Parameter	National discharge standards
BOD5 (mg/l)	50
Suspended solids (mg/l)	100
Faucal coliforms	10,000 counts/ 100ml
Chlorine residual (mg/l)	1 mg/l
pH	6-8
Phenols (µg/l)	0.2 mg/l
Oil and grease (mg/l)	10 mg/l
Total Phosphorus (mg/l)	10 mg/l
Temperature	20-35°C

Source: *The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999.*

Section 4 of this regulation requires facilities to install pollution control equipment for onsite management of waste, effluent and emissions.

Relevance: These regulations will influence management of effluent generated at construction sites, material extraction sites, workers camps and equipment yards.

5.3.5 The National Environment (Control of Smoking in Public Places), Regulations 2004

Second hand smoke (SHS) is a complex mixture of more than 4,800 chemical compounds, including 69 known carcinogens. WHO indicates that "scientific evidence has unequivocally established that exposure to tobacco smoke causes death, disease and disability". According WHO, SHS is a human carcinogen for which there is no "safe" exposure level 1. To avoid public health risk from SHS, Uganda enacted a law: (National Environment (Control of Smoking in Public Places) Regulations 2004) to avoid smoking in public places. Under this law, a public place is defined as, "any place to which members of the general public or segments of the general public ordinarily have access by express or implied invitation and includes any indoor part of a place specified in the schedule". These places include, office buildings, work places, eating areas, toilets and public service vehicles. The regulations task owners of such places to designate "NO SMOKING" and "SMOKING AREAS" in premises.

Relevance: In regard to the proposed road project, these regulations will apply to areas communally used by construction workers such as site offices, eating areas in camps and workers

transport vehicles. Requirements of these regulations should be fulfilled to avoid exposure of workers to tobacco SHS and attendant health risks.

5.3.6 The Environment Impact Assessment regulations, 1998

The National Environment Management Authority (NEMA) issued the Environmental Impact Assessment Regulations, for conduct of EIAs, which are now part of the Environmental Legislation of Uganda. The actual implementation of the EIA process remains a function of the relevant line ministries and departments, the private sector, NGOs and the general public. Part I-V of the EIA Regulations describes the process of preparing an Environmental Impact Statement.

Relevance: The ESIA for the proposed road project has been undertaken as per the process described in the regulations.

5.3.7 The National Environment Audit Regulations, 2006

Regulation 3 indicates the requirement for a regular environmental audit which is also stipulated in

Regulation 31 of the Environmental Impact Assessment Regulations, S.I. No. 13/1998. Regulation 4 requires that a person carrying out this audit should be duly certified and registered in accordance with the National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003. Furthermore, Regulation 14 provides for the manner in which the Environmental Inspector may carry out an enforcement audit.

Regulation 8 (1) of these regulations states that every owner or operator of a facility (activity) whose activities are likely to have a significant impact on the environment shall establish an environmental management system in accordance with these regulations. Under Regulation 8 (2), the Regulation goes on to state what the environmental management system should comprise of.

Relevance: Some of the proposed project activities are likely to have a significant impact on the environment. The developer or the project contractor will therefore be required to abide by the said regulation.

5.3.8 The Water (Waste Discharge) Regulations, 1998

Regulation 4 (1) of these regulations prohibits any person to discharge effluent or waste on land or into the aquatic environment contrary to the standards established under regulation 3 unless he or she has a permit issued by the Director of Water Resources. According to Regulation 4 (2) (a),

a person granted a permit under Regulation 4 (1) shall ensure that the effluent or waste discharged conforms to the maximum permissible limits established under regulation 3 (1).

Relevance: The proposed project will generate some waste such as concrete, sand, polythene, plastics, medical waste, food waste, and oil waste especially during the construction phase of the project at the construction sites and workshops. The developer for the project will have to abide by the said regulations.

5.3.9 Water Resources Regulations, SI No. 33/1998

The regulations apply to motorized water abstraction from boreholes or surface watercourses or diverting, impounding or using more than 400 cubic meters of water within a period of 24 hours.

Part II, Regulation 3 requires a water permit for operation of motorized water pump from a borehole or waterway. Under Regulation 6, application for a permit may be granted on conditions of projected availability of water in the area, existing and projected quality of water in the area and any adverse effect which the facility may cause among other considerations.

Relevance: The project will involve abstraction of water to be used for road construction and at road camps as such the Contractor will be required to abide by provisions of the law.

5.3.10 The Guidelines for Environmental Impact Assessment in Uganda

The National Environment Management Authority (NEMA) published EIA guidelines in 1997 where the EIA process and procedures are outlined.

Relevance: The ESIA for the proposed road has been carried out in accordance with the guidelines.

5.3.11 The Environmental Audit Guidelines for Uganda, 1999

Section 2.1.3 of the Environmental Audit Guidelines reiterates the National Environment Act's (Part II-Section 4 (3)) requirement for all on-going activities that have or are likely to have a significant impact on the environment to be subjected to an environmental audit. An environmental audit is defined under section 2 of the NEA as a systematic; documented, periodic and objective evaluation of how well environmental organization, management, and equipment are performing in conserving the environment and its resources. Section 23(i) of the National Environment Act gives NEMA the responsibility for carrying out Environmental Audits. Under section 2.1.4 of the Environmental Audit Guidelines, it is stated that NEMA may carry out the audits by certifying auditors to carry out the audits.

Under section 2.1.8 of the audit guidelines it is stated that a developer is expected to submit the first Environmental audit report to the Executive Director, NEMA within a period of not less twelve months and not more than thirty six months after the completion of the project or commencement of its operations, whichever is earlier, provided that an audit may be required sooner if the life of the project is shorter than the afore mentioned period. The guidelines under section 2.1.4 also reiterate section 23(3) of the National Environment Act that gives developers of projects for which an Environmental Impact Statement has been made the responsibility to keep records and make annual reports to the NEMA describing how far the project conforms in operation with the statements in the EIS, the ESIA report.

Relevance: The proposed project is likely to have some significant impacts of the environment. Therefore the developer will be required to undertake environmental audits for the road project and its ancillary facilities like quarry sites, workers camps that will undergo individual Environmental Impact Assessments.

5.3.12 The Draft National Air Quality Standards, 2006

Pollutants such as carbon oxides, Nitrogen oxides, Sulphur oxides, Volatile Organic Compounds, Hydrocarbons, Ozone (O3), Manganese and particulate matter such as dust are expected to be emitted especially by the project haulage vehicles and other machinery if ill serviced. The draft national air quality standards provide regulatory limits for these emissions (Table 47).

Table 47: Regulatory air quality standards for selected pollutants

Pollutant	Averaging time for ambient air	Standard for ambient air
Carbon dioxide (CO_2)	8 hr.	9.0 ppm
Carbon monoxide (CO)	8 hr.	9.0 ppm
Hydrocarbons	24 hr.	5 mgm^{-3}
Nitrogen oxides (NO_x)	24 hr. 1 year arithmetic mean	0.10 ppm
Smoke	Not to exceed 5 minutes in any one hour	Ringlemann scale No.2 or 40% observed at 6m or more

Pollutant	Averaging time for ambient air	Standard for ambient air
Soot	24 hr.	500 μg/Nm^{-3}
Sulphur dioxide (SO_2)	24 hr.	0.15 ppm
Sulphur trioxide (SO_3)	24 hr.	200 μg/Nm^{-3}

Note: ppm = parts per million; "N" in μg/Nm^{-3} connotes normal atmospheric conditions of pressure and temperature (25°C and 1 atmosphere).

Relevance: The developer of the proposed project is expected to abide with the regulatory limits in Table 47 at all worksites, quarries, equipment yards and workers' camps to ensure minimal impact on local air quality.

5.3.13 Uganda Standard Drinking (potable) water

This Standard prepared by the Uganda National Bureau of Standards (UNBS) prescribes the quality and safety requirements for drinking (potable) water. It also lays down the factors required during surveillance of water sources to ensure that the quality and safety of water is maintained. It describes two classes of drinking water; potable water available from conventional treatment processes such as chlorination, filtration and ozonation and; portable water available for water consumers through boreholes, protected springs, shallow wells, gravity schemes and harvested rain water which may be used for consumption in accordance with the guidelines provided by the Directorate of Water Development (DWD).

The Uganda Standard (US 201) is in line with the World Health Organization guidelines and also provides requirements and maximum limits for different physio-chemical and biological parameters for the two classes of drinking water mentioned above.

Relevance: The developer will have to ensure that the quality of water in the water sources noted by the project roads such as protected springs is kept with the standards even with implementation of the project.

5.3.14 Employment (Sexual Harassment) Regulations, 2012 (S.I. 2012 No. 15)

The Regulations prescribe that those who contravene the sexual harassment related provisions commit an offence and are liable, on conviction, to a fine not exceeding six currency points or imprisonment not exceeding three months or both.

Relevance: The project will employ both men and women. Where the sexual harassment related provisions of the regulations are contravened with, punishment will be in line with the regulations.

5.4 Multilateral Agreements

Uganda has signed and/or ratified a range of international agreements relating to the environment, both regionally and globally. The National Environment Act Cap 153 provides for the implementation of the International Conventions on Environment ratified by Uganda. The relevant Conventions for the proposed road project are discussed below.

5.4.1 Convention for the Safeguarding of the Intangible Cultural Heritage, 2003

The 2003 Convention for the Safeguarding of the Intangible Cultural Heritage calls on States that have ratified it to safeguard living heritage on their own territories and in cooperation with others. Ratified by more than 80 countries, it seeks to celebrate and safeguard the intangible heritage distinctive for particular communities. At the same time, the convention does not intend to establish a hierarchy among heritage elements or identify some as more valuable or important than others. The Convention affirms that the intangible heritage of all communities, whether they are large or small, dominant or non-dominant, deserves our respect.

The convention defines "*intangible cultural heritage*" as the practices, representations, expressions, knowledge, skills as well as the instruments, objects, artifacts and cultural spaces associated therewith that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity.

Safeguarding living heritage means trying to ensure that the heritage continues to be practiced and transmitted within the community or group concerned. Communities must be actively involved in safeguarding and managing their living heritage, since it is only they who can consolidate its present and ensure its future.
States that ratify the Intangible Heritage Convention are obliged to safeguard heritage through measures such as protection, promotion, transmission through formal and non-formal education, research and revitalization, and to promote greater respect and awareness. One practical measure required of each State Party is to identify and define the various elements of intangible heritage present on its territory, in one or more inventories.

The Convention sets out the duties of State Parties in identifying potential sites and their role in protecting and preserving them. Each member country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage. The State Parties are encouraged to integrate the protection of the cultural and natural heritage into regional planning programs, set up staff and services at their sites, undertake scientific and technical conservation research and adopt measures which give this heritage a function in the day-to-day life of the community.

Relevance: Some intangible cultural heritage may be discovered in the project area during the implementation of the project. The developer is obligated to safeguard any such discoveries.

5.4.2 UNESCO World Heritage Convention, 1972

In the international arena, the legal regime regarding cultural heritage basically emanates from the UNESCO World Heritage Convention, 1972. The convention is concerned with the protection of the world cultural and natural heritage. This convention gives the basis of recommendations developed by experts to conserve cultural heritage. Uganda is member of UNESCO and as such is bound by the recommendation made by the convention in the protection of cultural heritage. Ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory, each State Party to this Convention shall endeavor, in so far as possible, and as appropriate for each country (Article 4).

5.4.3 Rio Declaration (or Agenda 21)

The concept of public participation in development planning project is key aspect in this convention. From the most important conventions and declarations, one should note the Rio

World Conference on Environment and Development in 1992 (in Brazil) and the Aarhus Convention in 1998 (in Denmark) against which public participation in environmental matters became like a human right: '*Free access to information for the public and active participation in development project Processes'*.

Relevance: In line with the convention, the public was involved during the ESIA as detailed in Chapter 6 of this report.

5.4.4 The Convention on Biological diversity 1992 (CBD)

The CBD was one of the major outcomes of the 1992 United Nations Conference on Environment and Development, termed the "Earth Summit" in Rio de Janeiro. The three main goals of the

Convention on Biological Diversity (CBD) are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from utilization of genetic resources. The CBD calls for a much more holistic approach to biodiversity, by recognizing its ecosystem, species and genetic levels.

Relevance: Some project roads are within proximity to wetlands that are rich in biodiversity and as such the developer or his representative will have to observe the objectives of CBD during the implementation of the project.

5.4.5 Stockholm Convention on Persistent Organic Pollutants

This is a global treaty to protect human health and the environment from Persistent Organic Pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel. In implementing the Convention, Governments will take measures to eliminate or reduce the release of POPs into the environment.

Over 150 countries Uganda inclusive signed the Convention and it acceded into force, on 17th May 2004, 90 days after the ratification by the fiftieth country. This convention will be of relevance given the fuels and pharmaceuticals from the machinery and camp clinics respectively.

Under Annex C: Part III, the convention stipulates that some POPS including Polychlorinated dibenzo-p-dioxins and dibenzofurans, hexachlorobenzene and polychlorinated biphenyls may be unintentionally formed and released during open burning of waste, including burning of landfill sites. As such open burning of waste should be avoided.

Under Part V of the same Annex, the convention encourages the use of the following measures to prevent or reduce releases of the chemicals listed in Part I;

(a) The use of low-waste technology;
(b) The use of less hazardous substances;
(c) The promotion of the recovery and recycling of waste and of substances generated and used in a process;
(d) Replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and releases of persistent organic pollutants from the source;
(e) Good housekeeping and preventive maintenance programmes;
(f) Improvements in waste management with the aim of the cessation of open and other uncontrolled burning of wastes, including the burning of landfill sites.

5.4.6 The Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972)

The convention considers the following as "cultural heritage"; monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science. Each State Party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain.

Relevance: In case some of the cultural heritage elements mentioned under this convention are discovered during the detailed studies and the construction phase of the project, the Convention will be referred to. To that effect, a chance finds procedure has been defined to guide in safeguarding he cultural heritage elements.

5.4.7 The African Convention on the Conservation of Nature and Natural Resources, 1968

This convention was signed by the Heads of State and Governments of independent African States, assembled at Algiers, Algeria on 15th September 1968. The Contracting States to African Convention on the Conservation of Nature and Natural Resources are required to undertake to adopt measures to ensure conservation, utilization and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people.

The Contracting States to this convention are also required to ensure that conservation and management of natural resources are treated as an integral part of national and/or regional development plans. In addition during the formulation of all development plans, full consideration is required to be given to ecological, as well as to economic and social factors.

Relevance: Conservation of natural resources including the few wetland resources noted by some project roads will have to be taken seriously during the project as a commitment to this convention.

5.4.8 Strategic Approach to International Chemicals Management, 2006

The Strategic Approach to International Chemicals Management (SAICM) adopted by the International Conference on Chemicals Management (ICCM) on 6 February 2006 is a policy framework to foster the sound management of chemicals. SAICM was developed by a multi-stakeholder and multi-sectoral Preparatory Committee and supports the achievement of the goal agreed at the 2002 Johannesburg World Summit on Sustainable Development of ensuring that, by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health. SAICM comprises the Dubai Declaration on International Chemicals Management, expressing high- level political commitment to SAICM, and an Overarching Policy Strategy which sets out its scope, needs, objectives, financial considerations underlying principles and approaches and implementation and review arrangements. Objectives are grouped under five themes: risk reduction; knowledge and information; governance; capacity-building and technical cooperation; and illegal international traffic.

Relevance: For this road project, SAICM would predominantly apply to management of road marking paints to avoid risk to public and environmental health and its key objectives directly applicable to this project are:

- To minimize risks to the environment, public and occupational health throughout the life cycle of chemicals;
- To promote environmentally-sound recovery and recycling of hazardous waste;
- To ensure that humans and ecosystems and their constituent parts that are especially vulnerable or subject to exposure to chemicals that may pose a risk are taken into account and protected in making decisions on chemicals;
- To reduce generation of hazardous waste, both in quantity and toxicity, and to ensure the
- environmentally sound management of hazardous waste, including its storage, treatment and disposal;

5.4.9 The United Nations Framework Convention on Climate change (UNFCCC), 1992

Article 3(1) of the Convention states that Parties should act to protect the climate system on the basis of "common but differentiated responsibilities", and that developed country Parties should "take the lead" in addressing climate change. Under Article 4, all Parties make general commitments to address climate change through, for example, climate change mitigation and adapting to the impacts of climate change. Uganda being a member state of the United Nations therefore ratified the convention and has to abide by the principles of the convention.

Relevance: The developer is expected respond to the project activities linking to climate change and among others, to minimize cutting down of trees or compensate for any loss of trees arising from the project in line with this convention.

5.5 International /development partners Requirements and Guidelines

5.5.1 World Bank safeguard policies and guidelines

The 'Environmental and Social Safeguard Policies' of the World Bank consist of Operational

Policies (OP), Operational Directives (OD) and Bank Procedures (BP). World Bank safeguard principles are used by many funding organizations as best practice standards, some of the policies and guidelines that are relevant to the proposed road project are highlighted below.

- Environmental Assessment (OP/BP 4.01)
- Cultural Property (OP/BP 4.11)
- Involuntary Resettlement (OP/BP 4.12)
- Natural Habitats (OP/BP 4.04)
- World Bank guidelines on vulnerable people

5.5.1.1 Environmental Assessment (OP 4.01)

Section 7 requires that a range of Environmental Assessment instruments be used depending on the project. Section 8 categorizes the project according to type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. This policy emphasizes consultation and public disclosure. Section 15 requires that developer of category A and B projects consults the project-affected groups and local Non-governmental organizations (NGOs) about the project at least twice; shortly after the environmental screening and before terms of reference for the ESIA are finalized and once a draft ESIA report is prepared. The policy also requires that relevant material be provided in a timely manner prior to consultation and in a form and language that is understandable by groups being consulted (Section 16). Before the project can be appraised by the Bank, an ESIA report for such project (category A and B) has to be disclosed to the affected persons and the public. The policy requires Category A and B project ESIA reports to be disclosed at the World Bank Info shop (English).

A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or

environmentally important areas-including wetlands, forests, grasslands, and other natural habitats are less adverse than those of
Category A projects.

The proposed road project will not constitute a major change in land use as it focuses on improvement of a project already in place. The project is therefore not expected to have significant impacts that are unprecedented. Its environmental and social impacts can be readily identified, localized, and readily mitigated and managed. It is therefore classified as category B.

The O.P 4.01 consultation requirements for Category B projects were taken into consideration during the scoping phase and have also been taken into consideration throughout the comprehensive ESIA phase.

5.5.1.2 Cultural Property (OP 4.11)

Physical Cultural Resources (PCR) include resources of archaeological, paleontological, historical, religious (including graveyards and burial sites), or other cultural significance. These OP/BP 4.11 assist in preserving PCR and are held in avoiding the destruction or damage. The OP is relevant to project considering that it will involve excavations that may reveal PCR.

5.5.1.3 Involuntary Resettlement (OP 4.12)

The policy requires that involuntary resettlement be an integral part of project design, dealt with from the earliest stages of the project cycle. In general, the policy has been developed to address involuntary physical displacement and/or loss of other economical assets of people caused by Bank-financed projects and programs. The policy is intended for the executing agencies in the borrower countries and for Bank staff involved in identifying, preparing, and appraising projects that involve involuntary resettlement.

The policy specifically aims to avoid involuntary resettlement wherever feasible and to minimize resettlement where population displacement is unavoidable by exploring viable project options. The policy also provides that individuals or communities in case of loss of land, means of livelihood, social support systems or way of life;

- should be compensated for lost assets and loss of income and livelihood
- Assisted for relocation so that their economic and social future will generally be at least as favorable with the project as without it.
- provided with appropriate land housing infrastructure, and other compensation, comparable to the without-project situation

- fully informed and closely consulted on resettlement and compensation options.

The policy also specifies that lack of formal legal title to land should not stop any one from being compensated or given any other assistance. It further stipulates that appropriate assistance should be provided to poorest affected persons such as female-headed households, and other vulnerable groups such as indigenous peoples.

For every project that involves physical displacement of people from homes, lands, other assets, resources or services or loss of income and livelihood, the policy requires that the government of the borrowing Country or private project sponsor (developer) submits a satisfactory Resettlement Plan with time-bound actions and budgets before loan appraisal.

Relevance: The project roads are heavily built up hence breaking down of structures by the roads will be necessary especially at roads to be dualled. The developer will thus have to abide by the provisions in the policy.

5.5.1.4 Natural Habitats (OP 4.04)

The policy promotes environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions. The policy limits the circumstances under which projects can damage natural habitats. Specifically, it prohibits projects which would lead to significant loss or degradation of any Critical Natural Habitats, while in

Non-Critical Natural Habitats; feasible alternatives can achieve the project's potential overall net benefits.

Relevance: Some natural habitats specifically wetlands were noted by some project roads. Although the wetlands are already degraded, measures to mitigate further degradation of these wetlands during the project implementation will be proposed for the project's net benefit to be achieved.

5.5.1.5 World Bank guidelines on vulnerable people

The World Bank resources and toolkits for vulnerable people are relevant to this project. They describe the vulnerable as those who are most likely to fall through the cracks of regular programs and need to be protected from negative outcomes and/or allowed participation. Vulnerable people need to be given special attention to remove the barriers that stand in the way

of equal participation in projects, or through special project components and targeting strategies tailored to their needs.

Relevance: Groups of vulnerable people have been identified in the communities including women, making this safeguard relevant during implementation of this project.

5.5.2 World Health Organization guidelines

5.5.2.1 Air Quality guidelines

The World Health Organisation (WHO) provides air quality guidelines for ambient concentration. These are presented in Table 48.

Table 48: WHO Air quality guidelines and interim targets for particulate matter: 24hrs concentrations

	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	Basis for the selected level
Interim target-1 (IT-1)	150	75	Based on published risk coefficients from multi-Centre studies and meta analyses (about 5% increase of short-term mortality over the AQG value).
Interim target-2 (IT-2)	100	50	Based on published risk coefficients from multi-Centre studies and meta analyses (about 2.5% increase of short-term mortality over the AQG value).
Interim target-3 (IT-3)	75	37.5	Based on published risk coefficients from multi-Centre studies and meta analyses (about 1.2% increase of short-term mortality over the AQG value).
Air Quality Guideline (AQG)	50	25	Based on the relationship between 24-hour and annual PM levels.

Relevance: The air quality standards for Uganda are still in draft form. In the absence of the established standards, WHO air quality guidelines for ambient concentration were used to assess the air quality in the project areas. The air quality assessment results provide a basis for monitoring of the impact of the project on air quality.

5.5.2.2 Drinking Water Quality guidelines

The primary purpose of the guidelines is the protection of public health. The Guidelines describe reasonable minimum requirements of safe practice to protect the health of consumers and/or derive numerical "guideline values" for constituents of water or indicators of water quality. The Guidelines are applicable to large metropolitan and small community piped drinking-water systems and to non-piped drinking-water systems in communities and in individual dwellings.

Relevance: Some drinking water sources were noted by the project roads and as such the developer or his contractors will have to observe the drinking water quality guidelines during the implementation of the project.

5.6 Institutional framework

Key institutions identified responsible for ensuring compliance with legal requirements for the project and their mandate are summarized in Table 49.

Table 49: Key institutions responsible for ensuring compliance with relevant legal requirements

Institution	Department	Interests/mandate
Ministry of Water and Environment	National Environment Management Authority (NEMA)	Coordination, monitoring and supervision of environmental conservation activities directly or through District Environmental Officers at District level and Environmental Liaison units at ministries Review and approval of Environmental Impact Statements (EIS) in consultation with any relevant lead agencies
	Directorate of Water Resources Management (DWRM)	Water resource management, protection and use regulation through issuing water use abstraction , wastewater discharge permits, wastewater discharge, hydraulic works construction, borehole drilling and easement certificates; water resource monitoring and assessment.
	Uganda Wildlife Authority	Protection of wildlife
	Wetland Management Department	Wetland monitoring
	The Directorate of	Technical support services and capacity

Institution	Department	Interests/mandate
	Water Development (DWD)	development for water supply
	National Forestry Authority	Guidance on tree planting by the roads if recommended by design. Issuance of permits for tree cutting
Ministry of Gender, Labour and Social Development	Department of Occupational Health and Safety	Inspection of workplace environment to safeguard occupational safety, rights of workers and gender equity.
	Department of Community Development	Review Social Corporate responsibility actions taken
	Department of Gender	Monitoring Gender related aspects of the project
Ministry of Tourism, Wildlife and Antiquities	Department of Museums and Monuments	Policy formulation, planning and coordination of conservation and development of museums and cultural heritage. Monitoring road project construction activities, especially excavations at borrow sites to ensure that chance finds or artefacts of cultural significance are not destroyed.
Ministry of Local Government	Wakiso District Local Government	Environmental and social monitoring Review of ESIA reports Facilitate the registration and transfer of interests in land; Compile and maintain a list of compensation rates payable in respect of crops, buildings of a non-permanent nature and any other things that may be prescribed Review the progress of the land acquisition and resettlement implementation and problems, if any, identified through monitoring. Make decisions regarding actions to solve the problems and designate officers to carry out these actions

Institution	Department	Interests/mandate
Ministry of Lands, Housing and Urban Development	Uganda Land Commission	Land acquisition matters
Ministry of Energy and Mineral Development	Petroleum Supply Department	Monitoring of fuel use, transportation and storage to ensure safety
Ministry of Works and Transport,		Policy formulation and setting standards. Monitoring traffic management aspects of the project
Uganda National Roads Authority (UNRA)		Develop and maintain national road system, advise Government on general roads policy and contribute to addressing transport concerns.
Kampala Capital City Authority		Implementer of the project
National Water and Sewerage Corporation		Operation and provision of water and sewerage services across Uganda.
Road Committees		Sensitize communities about benefits of road development including participation in compensation matters and grievances, environmental monitoring and HIV/AIDS awareness
Wakiso District Land Board		Land allocation at local government level and setting compensation rates for crops and structures within District.
Department of Geological Survey and Mines		Controls the mining sector (including stone quarrying) through the Mining Act.
UMEME		Distribution of electricity
Telecommunication companies		Provision of communication services

5.7 Permits and Licenses

A list of some of the permits and licenses that may be necessary for execution of the project are indicated in Table 50.

Table 50: Permits required by the proposed development

Permit	Issuing Agency	Use	Responsibility
Certificate for Approval for EIA for the project	NEMA	Implementation of the project	KCCA
Wetland use permit	NEMA	Extraction of sand	Contractor
Forest Use permit	NFA	Extraction of sand	Contrctor
Water abstraction permit.	WRMD	Abstraction of water for road construction and domestic use at any established camps	Contractor
Hazardous waste storage, transportation and disposal license	NEMA	On-site storage of used waste such as used oil	Contractor
Permit to cut down NFA reserved species	NFA	Permission to cut down NFA reserved species.	Contractor

6. CHAPTER SIX: PUBLIC CONSULTATION

6.1 Public Participation Process

The International Association for Public Participation defines 'public participation' as a means to involve those who are affected by a decision in the decision-making process. It promotes sustainable decisions by providing participants with the information they need to be involved in a meaningful way, and it communicates to participants how their input affects the decision. This chapter describes the process of the public consultation for the proposed rehabilitation or construction of roads under KIIDP II program. Views from national stakeholders, local authorities and the likely affected communities were sought through meetings. The feedback from these consultations has been taken into account when preparing this report.

Section 12 of the Environment Impact Assessment Regulation of 1998 requires the developer to seek views of the communities that are likely to be affected by the project and to publicize the intended project, its anticipated effects and benefits in a language understood by those communities for a period of not less than 14 days. English and Luganda languages were used for the stakeholder consultation and community sensitization respectively. It is further required that days and times of community meetings be convenient for the affected persons and agreed with the local leaders. The World Bank's Operational Policy 4.01 also emphasizes consultation and public disclosure of a project.

The process of stakeholder consultation started at the scoping phase and continued throughout the detailed study phase of the project.

6.2 Participation Objectives

The broad objective of the stakeholder engagement process was to provide the authorities, interested parties and the communities likely to be affected by the project an opportunity to air out their views, concerns, and opportunities as regards the proposed project and to consequently address their concerns.

Specific Objectives

- To provide information about the project and to tap stakeholder information on key environmental and social baseline information in the project areas;
- To provide opportunities to stakeholders to discuss their views, opinions and concerns;
- To manage expectations and misconceptions regarding the project;
- To discuss potential impacts and verify significant or major environmental, social and health impacts identified; and
- To inform the process of developing appropriate mitigation and management measures as well as institutional arrangements for effective implementation.

6.3 Stakeholder Composition

A stakeholder is anybody who can affect or is affected by a project, policy, programme, plan or an organization. Stakeholder identification was based on issues related to the project scope of works, relevance and influence of the stakeholders and administrative and traditional setting of the project among others. The methods used to identify relevant stakeholders included: purposive selection, brainstorming, snow ball method and use of previous projects conducted in the same area. The stakeholders identified and consulted are categorized as follows:

i. National Stakeholders/Government Institutions

A number of stakeholders and government institutions at national level consulted were as follows;

- Kampala Capital City Authority (Client)
- Uganda National Roads Authority (UNRA)
- Ministry of Gender, Labour and Economic Development (MGLSD)
- UMEME Limited
- Uganda Museum, Department of Historical monuments, Ministry of Tourism, Wildlife and Antiquities.
- Nature Uganda
- MTN
- Wetland Management Department

ii. Local Government Institutions/Officials

Officials (both technical and political) from the local governments of Kampala (Lubaga, Makindye, Nakawa, and Kawempe Central Divisions) and Wakiso Districts (Makindye Ssabagabo Sub County) were consulted. They included the following.

- Environmental Officers for the respective divisions
- Town Clerks for the respective divisions
- Mayors for the respective divisions
- Deputy Mayors for the respective divisions
- Councillors for the respective divisions
- Chairperson Eng./Physical Planning & Education/Social Services
- Division Ward Administrators
- Division Administrative Officers

- Supervisors of Roads
- Community Developmental Officers in the respective divisions
- Physical Planners - Division
- Chairpersons, Local Council Is
- District / Division Engineering Department
- Chairperson, Gender Community Services and Production - Division
- KCCA Environment and Resettlement Action Plan Division
- Chairpersons and Vice Chairpersons, LC IIIs
- Sub County Chief Makindye Sabagabo
- Speaker and other officers of Wakiso District
- Deputy Speaker Wakiso District
- District Security Officer, Lubaga Division

iii. Other stakeholders

- Community members along the project roads
- Special interest groups such as the women and boda boda riders
- Non-Governmental Organisations
- Health facilities along the roads
- Educational faciltiies along the roads (Table 51)

Table 51: Names of the institutions consulted during EIA phase

No.	Name Of Road	Educational Institution
1.	8th Street Namuwongo	Kisugu Central Primary School
2.	Buwambo-Kitezi	Mpererwe Primary School
3.	John Babiha	Kabojja Junior School
4.	John Babiha	Springdales Nursery School
5.	Kabuusu, Kitebi, Bunamwaya	
6.	Kabuusu, Kitebi, Bunamwaya	Kitebi Right Primary School
7.	Kabuusu, Kitebi, Bunamwaya	Kiira Preparatory School
8.	Kabuusu, Kitebi, Bunamwaya	Kitebi Primary And Boarding School
9.	Kabuusu, Kitebi, Bunamwaya	Kitebi Primary School
10.	Kabuusu, Kitebi, Bunamwaya	Kitebi Secondary School
11.	Kabuusu, Kitebi, Bunamwaya	Kitebi Bright
12.	Kabuusu, Kitebi, Bunamwaya	Kiira Preparatoey Acedemy Day and Boarding Primary School

13.	Kabuusu, Kitebi, Bunamwaya	Kitebi Church Of Uganda Mothers Union Nursery And Day Care
14.	Kabuusu, Kitebi, Bunamwaya	Alfred Junior School.
15.	Kabuusu, Kitebi, Bunamwaya	St. Marys Daycare Nursery And Primary School.
16.	Katalima	Humble Nursery and Primary School
17.	Kayemba Road	Godnet Junior School
18.	Kayemba Road	Minaka P/S
19.	Kayemba Road	Erina Bright Primary School
20.	Kibuye-Nateete-Busega	St.Mark C.O.U
21.	Kibuye-Nateete-Busega	Busega Literacy And Vocational Centre
22.	Kibuye-Nateete-Busega	YWCA Nursery Sc.
23.	Kirombe Road	Makindye Trinity S S
24.	Kirombe Road	Presbyterian Junior School
25.	Kisaasi Road	Speed Way Primary School
26.	Kulambiro Road	Mother Love Primary School
27.	Kulambiro Road	Motherly Love Islamic Nursery And Primary
28.	Kulambiro Road	St. Martin Primary School
29.	Luwafu Road Mobutu-Salaama Junction	Circle Of Peace School.
30.	Luwafu Road Mobutu-Salaama Junction	Kibuye Primary School.
31.	Mugema	Busega Domestic Science Collage
32.	Mugema	Muslim Girls' Primary School
33.	Muteesa I Road	Streams Of Life Church
34.	Nakawa Ntinda	Uganda School For Deaf Ntinda
35.	Nakawa-Ntinda	Ntinda Plice Childrens'school
36.	Namungoona	Kasubi Modern Islamic Primary School
37.	Namungoona	Kasubi Secondary School
38.	Namungoona	Jeje Nursery And Primary School
39.	Namungoona	Kiddawalime Primary
40.	Namungoona	S.T John's Hill Nursery School
41.	Namungoona	Namungoona H S
42.	New Port Bell Road	New Angels Nursery And Day Care
43.	New Port Bell Road	Rock Hill Secondary School
44.	New Port Bell Road	Kinder Kamper Kindergaten
45.	Old Mubende Road	Vicross Primary & Nursery School

46.	Old Mubende Road	Star Secondary School
47.	Old Mubende Road	New Kabale Busega Primary School
48.	Old Mubende Road	Star Secondary School
49.	Old Port Bell Road	The Ark Kindergarten
50.	Salama Road	Pen. Star Primary And Nursery School
51.	Sentema Road	Namungona Kigobe Primary School
52.	Sentema Road	Step By Step Primany School
53.	Sentema Road	Glorious Kindergarten
54.	Sentema Road	Glory Education Centre
55.	Sentema Road	St Andrews Primary School
56.	Sentema Road	Masanafu Secondary School
57.	Sentema Road	Auntie Clare Kindergaten Ltd
58.	Sentema Road	Red Hamisha Needy Primary Sch
59.	Sentema Road	Smartless Early Learnig Centre
60.	Sir Apollo Kaggwa Road	Makerere Primary School
61.	Sir Apollo Kaggwa Road	Divine Mercy Nursery And Rehabilitation Center
62.	Sir Apollo Kaggwa Road	Sunrise Nursery And Primary School
63.	Sir Apollo Kaggwa Road	Glad Tidings Bible College
64.	Sir Apollo Kaggwa Road	Sir Apollo Kaggwa Road Primary School
65.	Sir Apollo Kagwa Road	Play Den Nursery School
66.	Sir Appollo Kagwa Road	Multech Business School
67.	Ssuna Road	Summer Junior School
68.	Suna 1	Kabowa Hidayat Islamic School
69.	Suna 2	Vienna High School
70.	Suna 2	Trinity Primary School
71.	Suna 2	Kinder Ville Pre School
72.	Suna 2	Trinity Children's Centre
73.	Wakaliga Road	Sir Apollo Kagwa
74.	Wamala Road	Kampala School Of Nursing And Health Sciences

6.4 Stakeholder briefings and community consultation

This activity commenced in the month of May 2015 at the scoping phase and continued throughout the detailed phase of the study i.e in the months of June, July, August September and October 2015.

For all meetings, a brief introduction of the project was given, the purpose of the ESIA was explained, the various project activities to be undertaken at the different phases of the project were described and the different teams of experts to carry out the activities were provided. The team then guided the participants to obtain their views. Questions from the participants were answered and some misconceptions about the project clarified. Views and concerns from the stakeholders were recorded. In addition, pictures of the meetings were taken and attendance lists were filled by the participants (Appendix XVII)

6.4.1 Meetings with National and Local Government Leadership and other Stakeholders

The team made several appointments with the different stakeholders at the local and national levels and these included; national government officials at the selected institutions / ministries, Districts and Divisions. Appointments with some of the stakeholders were made by writing to them directly while for others appointments were made through their secretaries and some leaders were directly approached physically or on phone. In some cases, impromptu meetings were held with the stakeholders. For the local government officials at Wakiso District and Divisions, the leadership was instrumental in mobilization of the relevant stakeholders. Stakeholders were either met individually or as a group in their respective offices for in-depth discussions. For the health and education institutions and NGOs along the project roads, information was sought through a short questionnaire administered by a research assistant (Appendix III).

This process was all-inclusive, transparent and highly participatory, through the provision of sufficient information regarding the proposed project. Stakeholders who were consulted enthusiastically participated in the interactions. The project was described and issues arising and the comments and/or areas of concern from the stakeholders were documented.

6.4.2 Meetings with communities

Mobilization of the communities was done through the chairpersons of the respective villages. A total of 24 meetings for 56 villages were organized and 2 Focus Group Discussions were held with the women of Mpererwe and boda boda riders of Kanyanya-Komamboga. Approximately 1,323 community members were consulted and of these 40% of the participants who turned up were women. All the community meetings were conducted in the local language, Luganda.

Table 52 shows the stakeholder engagement schedule for the different meetings held with the different stakeholders and Plate 21 shows pictures of some of the meetings held with the stakeholders.

Table 52: Stakeholder Engagement Schedule

No.	Institutions/Officials	Venue	Participants	Date/ Time
A	**National Stakeholders**			
1	MGLSD	MGLSD offices	Keys staffs	25th May 2015
2	KCCA	KCCA officials	Keys staffs	12th May 2015
3	UNRA	UNRA offices	Keys staffs	4th June 2015
4	UMEME	UMEME offices	Keys staffs	30th July 2015
5	Nature Uganda	Nature Uganda offices	Keys staffs	31st July 2015
6	Uganda Museum	Uganda Museum	Keys staffs	3rd August 2015
7	Ministry of Water & Environment (Department of wetlands)	Ministry of Water & Environment	Keys staffs	7th August 2015
8	MTN	Over phone	Key staff	16th May 2016
B	**Local Stakeholders (i.e. Divisions/Sub Counties)**			
1	Lubaga Division staff	Lubaga Division	Technical/ Politicians	11th May 2015 10am
2	Makindye Sabagabo	Makindye Sabagabo	Technical/ Politicians	11th May 2015 2pm
3	Wakiso District	Wakiso District Headquarters	Technical/ Politicians	27th May 2015 10am
4	Makindye Division	Makindye Division	Technical/ Politicians	29th May 2015 9am
5	Nakawa Division	Nakawa Division	Technical/ Politicians	29th May 2015 12.pm
6	Kawempe Division	Kawempe Division	Technical/ Politicians	2nd June 2015 10am
7	Central Division	Central Division	Technical/ Politicians	16th June 2015 10 am
C	**Local Communities**			
1	Lugala	Lugala	Community Members	24th May 2015

2	Masaku, Juuko, Waswa & Kavule	Hollywood	Community Members	23rd May 2015 10am
3	Kulambiro	Kulambiro	Community Members	20th June 2015 10am
4	Ntinda A, Butuukirwa zone, Kalinabiri 1	Ntinda primary school	Community Members	20th June 2015 10am
5	Kikaya B, Kikaya A, Kitambuza zone	Kampala quality school	Community Members	20th June 2015 2pm
6	Nsambya- Gogonya	Youth centre nsambya	Community Members	19th June 2015 10am
7	Tyaba, Katimbo, Nsereko, Kasule & Mponye	Supermarket ground parking	Community Members	19th June 2015 10am
8	Kabawo, Kweeba, Kitebi, Kigaga, Nyanama	Kitebi primary school	Community Members	18th June 2015
9	Namugoona	Royal Hotel	Community Members	17th June 2015 10am
10	Church zone, Lungujja zone, Central A, Central B, Nabisasiro zone, Kubumbiro A, Kubumbiro B	Ruth Gardens	Community Members	17th June 2015 11am
11	Bulange A	Bulange A	Community Members	17th June 2015 2pm
12	Tuula	Near Tuula Junction	Community Members	16th June 2015 10:30am
13	Kasubi	Kasubi	Community Members	16th June 2015 2pm
14	Mukiibi Zone A, Kalanda zone B, Nsumba zone C & Sentumbwe zone D	Community Hall next to kikoni police post	Community Members	16th June 2015 2:15pm
15	Kisalosalo	Kisalosalo	Community Members	15th June 2015 10am
16	Ndungu zone/Kaniisa zone	Fire centre	Community Members	15th June 2015 11am
17	Kitezi/Bumba, Lusanja, Kitezi, Mbamba & Kitagobwa	Kitezi police post	Community Members	15th June 2015 2:09pm

18	Kawempe II & Mpererwe	Mpererwe Church	Community Members	15th June 2015 2pm
19	Kanyanya-Kitambuza	Kanyanya-Kitambuza	Community Members	24th June 2015 11am
20	Kikaya	Kikaya	Community Members	25th June 2015 11am
21	Komamboga	Central boda boda stage	Community Members	2nd July 2015 11am
22	Ssekati, Namere	Mpererwe Church	Community Members	2nd July 2015 2:30pm
23	Nateete	Bible League Nateete	Community Members	5th September 2015 9am
24	Kivumbi zone, Central D, Factory Zone & Church zone	Biva entertainment centre	Community Members	5th October 2015 4pm


a


b


c


d


e


f

Plate 21: Meetings with stakeholders: (a) Stakeholder Consultation Meeting at Council Chambers, Lubaga Division (11th May 2015); (b) Stakeholder Consultation at Makindye Sabagabo Sub County (11th May 2015); (c) Stakeholder Consultation at Central Division (16th June 2015); (d) Stakeholder Consultation at Nakawa Division (2nd June May 2015); (e) Stakeholder Consultation at Makindye Division (29th May 2015); (f) Stakeholder Consultation at Kawempe Division (2nd June 2015); (g) Community Sensitization Meeting at Hollywood (Kibuye) Makindye Division (23rd May 2015); (h) Community Sensitization Meeting at Lukuli (19th June 2015); (i) Community Sensitization Meeting at Kampala Quality primary school (20th June 2015); (j) Community Sensitization Meeting at Namugoona Kigobe P/S, Lubaga Division (23rd May 2015); (k) Community Sensitization Meeting at community centre Kikoni along Sir apollo – Kaggwa road (16th June

6.5 Issues raised

During the consultative meetings, a number of issues/concerns were raised and suggestions provided by the different stakeholders as shown in Table 53-56 below.

Table 53: Issues raised by National Stakeholders

Stakeholder	Issues Raised	Response
Ministry of Gender, Labour and Economic Development	• The design should cater for people with disabilities by creating lanes and zebra crossing points to allow the vulnerable people to move freely. •	Walkways and protected pedestrian crossings have been considered in the design on all the the roads at the key signalised intersections and key known crossing points.
	• The contractor should develop a safety and health plan to deal with the safety and welfare of the workers including medication, checkups, PPE, first aid, drinking water, toilets, rest areas for workers before they are employed to ensure that he/she is healthy and able to carry out the assigned tasks and system of employment of labor force and gender considerations. • Ensure that the materials that are going to be used during the project implementation are not harmful to the workers and those around the project area. • Workers should be provided with water, first aid kits, resting places and many more to make sure workers are safe and healthy.	An Occupational and Community Health and Safety Plan has been recommended as a requirement during the implementation of the sub project roads
	• Ensure traffic management to avoid accidents	A Traffic Management Plan hass been recommended as a requirement during the implementation of the sub project

Stakeholder	Issues Raised	Response
		roads
Uganda National Roads Authority	• Comments obtained from UNRA should be considered during the design and project implementation. • Improvements under the following projects which can be obtained from UNRA if not already with KCCA should be taken into consideration during the design; - Proposed Kampala Mpigi-Express way - Upgrade of Busabala road - Kampala Southern bypass that crosses Port bell road at Silver Springs - Kampala-Jinja Expressway - Kampala Flyover project - Kampala Northern Bypass 2 for which some activities are already on-going - Local seal of Kabuusu-Kitebi-Bunamwaya intended for this year 2015 - Other UNRA projects around the Seguku area • Provide UNRA with information on the Kayemba road Underpass designs so that it is incorporated into the designs for Kampala-Mpigi-Express way • The Nakawa Ntinda road should be dualled right up to the Northern Bypass to take into consideration the proposed improvements of the bypass roundabout at Kisaasi. • The designs for Old Port bell road should take into consideration the proposed standard gauge railway designs under Ministry of Works.	Information from UNRA has been considered in the designs of the roads in question e.g. Old Portbell road.

Stakeholder	Issues Raised	Response
	• Do not let compensation stop you from designing and planning good roads. • Plan for safety fences, facilities for the disabled, pedestrian ramps, landscaping as is with the Kampala flyover project • Other Junctions along the Lugogo bypass especially the one next to Lugogo bypass 2 junction where many accidents have happened should be added to the list for signalization. • Attempt by UNRA to form road committees failed because of lack of governance in terms of facilitation and accountability but could work if those issues are resolved.	
Uganda Museum, Department of Historical monuments, Ministry of Tourism, Wildlife and Antiquities.	• There are a number of features of archaeological importance in Kampala e.g. the monuments at clock tower and Kasubi World Heritage These historical buildings and monuments should be conserved to avoid losing their aesthetic value.	The key historical buildings and monuments will not be destroyed by the construction of these roads.
	• Relevant policies should be reviewed e.g. Cultural Policy, World Bank policies, the Historical Monument Act of 1997, World Convention of 1972, and Local Government Act.	All the relevant policies have been reviewed and included in the report.
	• An Archaeologist or Cultural Heritage Specialist should be involved in the feasibility studies and designs to avoid negative impacts on the	An Archaeologist was part of the feasibility studies. It is recommended as a mitigation

Stakeholder	Issues Raised	Response
	cultural heritage.	measure to involve An Archaeologist or Cultural Heritage Specialist during the construction phase.
UMEME	• There will be relocation of utilities which involve land acquisition, compensation and permits. KCCA should ensure that all matters are settled before project completion.	A Utilities Relocation Plan by the Contractor is one of the recomemndatins given before commencement of construction.
	• All agreements should be in writing to avoid any misunderstandings. UMEME will provide all the necessary channels of how to acquire the necessary permits.	
	• Sensitive areas like market places, schools, wetlands should be identified in the ESIA.	These have been identified in the ESIA.
	• Contractors may damage UMEME infrastructure. These will require restoration.	A Utilities Relocation Plan by the Contractor is one of the recomemndatins given before commencement of construction.
	• UMEME should be provided with the implementation work plan in advance before commencement of construction activities to enable them prepare for shutting down the power wherever necessary.	•
Nature Uganda	• Community health and safety: Some signposts are put in wrong places causing accidents, some roads do not have walkways and crossovers on junctions which vulnerable people like children, disabled and elderly people can use. Some roads have ditches and gutters that are dangerous to people using the road. Traffic lights and boda boda people and all other safety concerns should be considered during the design of the	• The design has put into consideration lighting, proper drainage and proper signage.

Stakeholder	Issues Raised	Response
	roads and road junctions.	
	The existing trees should not be destroyed. The road reserve should be used for tree planting so as to conserve biodiversity and the beauty of the city.	Revegetation where possible has been included as one of the mitigation measures.
	There should be green belts in the city, public parks and wetlands. Nakivubo channel and Lubigi are very important in the city as they offer the regulatory ecosystem services.	
	The following legislation and policies should be reviewed; Riverbank regulations, Environmental policy, Wildlife policy and Act, International conventions such as Convention on Biodiversity, Convention on Migratory Species	All the relevant legislation has been reviewed.
MTN	The officer in charge of Access Planning; Eng. Godfrey Kakeeto advised on the following: • Notify the Chief Technical Officer about the proposed project roads through formal communication requesting for support before relocation of the cables. • Work closely with MTN engineers during the relocation process for technical guidance and support to minimize possibilities of damages to the cables.	It has been recommended that the contractor liases and works closely with utility owners.

Table 54: Issues Raised by Local Government Officials

Stakeholder	Issues Raised	Response
Makindye Division	Compensation	Affected Property will be compensated. A resettlement Action Plan is under preparation
	The leaders proposed that the design cater for walkways	Sidewalks are included on all project roads under this assignment. They are 1.25m wide.
	The leaders requested that the drainage system be provided for the design.	Proper drainage has been provided in the design
	Leaders requested Makayi road to be considered for studies.	Mackay road is not part of this study.
Nakawa Division	When is construction of these roads expected to commence?	Construction is expected to commence when all studies, designs, land acquisition and procurement of a contractor have been finalised
	When will the Resettlement Action plan (RAP) commence?	RAP studies will commence after the completion of the designs.
	Provide employment opportunities to the local people.	Employment to local people wherever possible has been provided as a mitigation measure to minimize the influx new people in the area.
	What is the entire cost of the road project?	The entire cost of the project can be determined after the studies have been completed and will be provided by the design team.
Kawempe Division	When will peging of the roads commence?	Pegging off the Right of Way will commence when the designs have been approved.
	The leadership is afraid that road signs and lights will be	It is our responsibility as citizens to fight this vice

	removed by wrong people.	in collaboration with KCCA and other security agents
	When is implementation of the project commence?	Construction is expected to commence when all studies, designs, land acquisition and procurement of a contractor have been finalised
	Has KCCA considered drainage in this property?	Proper drainage has been considered in the design.
	Which people will be compensated?	People eligible for compensation include those who own property like land and structure
	Good quality materials should be used during the construction of these roads.	There will be a monitoring and supervising team to ensure that contractor meets all the required standards.
Central Division	Will Newplan share with us findings from the ESIA studies?	ESIA report will be prepared and submitted to KCCA and National Environment Management Authority (NEMA). NEMA and KCCA will share these reports with the stakeholders
	When is implementation of the project commence?	Construction is expected to commence when all studies, designs, land acquisition and procurement of a contractor have been finalised
	The water logged areas should be incorporated from planning stage	The design has put into consideration land in wetlands.
	The leaders recommended that the drainage channels be covered to prevent people from dumping in rubbish.	The design has in some places considered closed drainages and in others open drainages depending on the feasibility.
	Widening of these roads should be given priority for example the Sentema road.	The design team has considered all factors when designing the roads.

	These roads must be covered with a firm surface	There will be a monitoring and supervising team to ensure that contractor meets all the required standards.
Wakiso District Local Government	Compensation .	Affected property will be compensated. A Resettlement Action Plan will be prepared.
	Has project identified resettlement areas?	The project will as much as possible minimize resettlement. However, in the event that some households have to relocate, PAPs will be free to choose their relocation areas.
	What Compensation rates will be applied?	Kampala District Compensation rates will be used.
	Who will be responsible for maintenance of the road after construction?	Wakiso district Local Government will entirely be responsible for maintenance of the road under their jurisdiction
	Has UMEME and National Water and Sewerage Cooperation (NWSC) been involved?	UMEME has been consulted. NWSC will also be involved before commencement of construction.
	Requirements for compensation	These will include; proof of property ownership, valid identifications and any other relevant documentation that may be required e.g. Letters of Administration, Power, of Attorney etc.

Table 55: Issues Raised by Project Affected Communities

Stakeholder	Issues Raised	
Cluster 1 (Kabuusu-Kitebi-Bunamwaya road, Ssuna road 1, Ssuna road 2, Muzito road and Wamala road	How will the project treat tenants since majority of the tenants live on the King's land?	Tenants living on King's land will be paid and the King as well will be paid being the landlord.
	When should we expect to be compensation?	Compensation of affected property is expected to be done before start of construction.
	Who will incur the costs of demolition of affected structures	The PAPs will be given a chance to demolish affected structures after receiving compensation packages so that they can salvage any materials they may be interested in. However, if the PAPs are not interested, then the contractor will demolish any affected property
Cluster 2 (Lukuli road and its junction; Kayemba-Lukuli, Kirombe road and its junctions; Hanlon-Kabega, Kayemba road and its junction; Kayemba-Katwe)	How much of the road is affected?	This will depend on the design and the land take for each person
	When will the project start?	Construction is expected to commence when all

Stakeholder	Issues Raised	
		studies, designs, land acquisition and procurement of a contractor have been finalised
	The road width to be affected should be equal on both sides of the road.	When constructing roads resettlement is minimized because they wouldn't want to resettle many people
	Which rates are you going to use?	Kampala district rates
	During time for payment, will they pay only the landlords or even the tenants?	Landlords and tenant will be paid for land
Cluster 3 (Tuba road, Kulambiro-Najeera and Kulambiro Ring road)	Drainages should be included in the designs.	The design has taken into consideration the drainage aspect.
	Do give cash compensation?	Entire house will be compensated
	Do you compensate a whole house if a half section is affected?	Yes, the full house will be compensated.
	Will compensate people without house plans?	Yes, people without house plans will also be compensated.

Stakeholder	Issues Raised	
Cluster 4 (Nakawa-Ntinda road and its junction; Naguru junction, Martyrs way junction and Ntinda T/C, Ntinda-Kisasi road, Bukoto-Ntinda and its junction; Magambo junction) Cluster 5 (Naguru road, Katalima road, Lugogo Bypass 2 junction)	Will landlords and tenants (bibanja holders) be compensated?	Both Landlords and tenants will be compensated for the land
	Will PAPs without approved plans be compensated?	All eligible PAPs will be compensated with or without approved plans
	Will the project compensate people with land wrangles	People with land wrangles will not be paid until the wrangles have been resolved
	Who will be responsible to relocate public utilities	The contractor in liaison with utility owners will be responsible for relocating any affected utilities.
	Proper drainage should be constructed.	The design has taken into consideration the drainage aspect.
	The narrow roads should be widened.	The design consultant has considered many factors when designing these roads. Where space allows, the roads will be widened.
Cluster 9 (A109 road,	How will the project compensate people without land titles?	The rate for land without land titles is different

Stakeholder	Issues Raised	
Old Mubende road, Mugema road, Sentema road, Muteesa 1 road, Ndeeba junction, Kabuusu junction, Bulange junction, Kigala road and its 2 junctions, Lungujja road and its 7 junctions)		from that of titled land.
	Will people be taxed for the compensation packages?	No one will be taxed for compensation packages
	Under valuation	The valuers will follow the required legislation and guidelines when valuing affecting property.
	Will the project widen Sentema road? Currently, the road is too narrow to be shared by motorists and pedestrians.	
	When will land survey and property assessment start?	After obtaining the approved designs from KCCA and SMEC
	Will the project compensate for land only?	Land, structures, crops and trees will be compensated
Sir Apollo-Kagwa road	The road design should cater for pedestrians	Sidewalks are included on all project roads under this assignment. They are 1.25m wide.
	Will there be fairness in this project especially between the rich and the poor	PAPs property will be assessed fairly without discrimination
	Will the project return peoples' land titles after demarcating the	The mother titles will be returned to owners as

Stakeholder	Issues Raised	
	project land?	soon as demarcation of the project land is complete.
	How will the project deal with tenants?	Tenants will be compensated for their affected property
Namungoona road	How will people with land titles in the bank be treated?	They will be paid after providing evidence of the title
	Will compensation be made to small pieces of land?	This will be handled case by case, based on the size of land take.
	Blocking access roads leading to people's home is a big problem with construction of roads.	Provision of alternative access is provided as one of the recommendations for this impact.
Buwambo-Kitezi road	Commencement and completion of the project	Project construction will start after completion of the studies such as the detailed engineering design, ESIA and RAP studies.
	Delay to return land titles to the PAPs	After demarcation of project land, land titles will be returned to the rightful owners as soon as possible.
	Install road signs and humps on the road	Roads signs have incorporated in the design.
Kyebando Ring 2	Project affected communities are afraid that KCCA will not pay them for the affected properties	Property that is eligible for compensation will be compensated.
	What property is eligible for compensation?	Structures, land, annual / perennial crops, trees.
	Employment opportunities to local people	Employment opportunities to the local people have been recommended have been in the report.

Stakeholder	Issues Raised	
Kisasi road 2	Commencement of the project	Construction is expected to commence when all studies, designs, land acquisition and procurement of a contractor have been finalised
	Will the project compensate tenants?	The project will compensate both tenants (bibanja owners) and landlords
	Has the project incorporated the aspect of drainage on the design?	The design has provided for proper drainage on all the roads.
Kawempe junction	Some people initially affected by the previous construction complained that they were not compensated.	•
	The road has no parking for vehicles and it lacks walkways and the road is narrow.	
	The Tula road is insufficient, given that the drainage systems are small. They appreciate that the road was done, but they need to improve on the drainage systems and also to divert the water to the wetland and not to people's houses	•

Table 56: Issues raised by other stakeholders

Stakeholder	Issues raised	Response
Women	Women argued that they have not benefited from projects of this kind, the women who are lucky to work in these projects are normally given donkey work.	As one of the recommendations, equal opportunities for both men and women will be given.
	The women would like KCCA officials to allow women continue operating their businesses after the construction of the proposed roads is complete. The women argued that the moment they are evicted, their households will have nothing to feed on.	The will be no encroachment on the road reserve for safety purposes.
	KCCA should extend credit facilities to boost women businesses. Majority of women have no access to finances	
	Women are worried that KCCA will evict people without compensation like it has been doing in other places. KCCA evicts people without notice and without giving such people enough time.	All eligible property for compensation will be compensation. It has also been recommended that ample time be give to people before leaving the affected areas.
	What kind of crops will be compensated?	Compensation will be made to perennial crops and for the case of seasonal crops, people will be given time to harvest.
	Women appeal to KCCA to construct markets in the city suburbs. Women argued that this will help to reduce people who operate from illegal places and along road sides.	
	• KCCA levies high taxes on market vendors and shop operators and as a result many of their businesses have collapsed.	

Stakeholder	Issues raised	Response
	Women also argued that despite high taxes levied on them, the method of collection is brutal.	
Cyclists (boda-boda riders)	Boda boda riders urged KCCA to designate stages. The riders argued that boda stages have become many and many of these stages are located in illegal or dangerous areas**.**	•
	Boda boda riders request KCCA officials to construct humps along the roads to control the speed of motorists.	Safety issues have been considered in the design.
	The riders requested KCCA officials to place road signs on all roads to inform the motorists and other road users and thus reduce on the risk of accidents.	Road signs have been considered in the design.
	The riders requested KCCA to install lights on all roads so as to provide security to all road users.	The design has taken into consideration lighting on the different roads.
	The riders urged KCCA officials to open new access roads before construction of the proposed road starts to help in reducing congestion.	Alternative access has provided as a recommendation to the Contractor.
	Boda boda riders pointed out that KCCA officials ask for bribes	
	The riders requested that KCCA officials reduce on their brutality. They confiscate their motorcycles and sometimes they are flogged.	
NGOs, education and health institutions	• Expect a lot of dust during the construction phase. • Information about the proposed interventions	•

Stakeholder	Issues raised	Response
	should be disseminated to the people from time to time using all possible means. • Put Zebra crossings and road signs in busy areas especially where there are schools. • Put humps along the roads to reduce the risk of accidents. • Contractor should be careful not to destroy underground water pipes.	
	• Destruction of property, interruption of activities and blocking access to premises close to the road.	•
	• Noise pollution during construction •	•
	There will be increased accidents due to over speeding after road construction	•
	Increased traffic jam during construction	•

6.6 Stakeholders during the Construction Phase

Stakeholder consultation and participation will be a continuous process throughout all the stages of the project. A Stakeholder Engagement Plan and Grievance Management Procedure will be prepared by the Contractor prior to commencement of construction activities.

The following key stakeholders among others will be consulted;

- Government ministries and Utility owners with property along the different roads e.g. National Forestry Authority, National Water and Sewerage Cooperation, MTN, AIRTEL
- Community members including;
    - Market vendors along each road where applicable. These will include both those operating within the markets legally and those operating illegally along the roadsides. It should be noted that along some roads like Acacia Avenue, Sezibwa road, Spring road there were no markets noted.
    - Bodaboda and Taxi operators along the different roads. Some boda boda stages are designated by KCCA while others are not. All these will need information disseminated to them regarding the notice to vacate and give way for construction activities.
    - Traders along the different roads i.e. operating within buildings and those operating at the roadsides.
    - Owners and renters of buildings along roads with high value structures such as Accacia road, Sezibwa road, 5th, 6th, 7th Streets, Ntinda-Nakawa road, Bukoto Ntinda road.
    - Owners and renters of buildings along other roads
- Institutions along the respective roads e.g. schools, religious institutions
- Security organs at the Division Level
- The general community along the different roads.
- Plus any other as identified by the Contractor

6.7 Salient issues to be considered during implementation

- Wherever feasible avoid blocking entrances to the buildings or access roads. If not possible provide alternative access.
- Provide employment to the local communities
- Ensure compliance to standards for a good quality road
- Ensure restoration of areas used for dumping soils.
- Prepare and implement the required Management Plans

- Continuous engagement with the communities to reduce on the risk of misunderstandings, conflicts that could in turn result into delays.

7. CHAPTER SEVEN: ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS AND PROPOSED ENHANCEMENT/MITIGATION MEASURES

7.1 Preconstruction phase

7.1.1 Socio-economic impacts

7.1.1.1 Positive impacts

a. Employment opportunities

Employment opportunities will be available for some few people who may work with the project team during the different surveys such as socioeconomic surveys, land surveys, engineering surveys, geotechnical surveys and traffic surveys among others. Available jobs in this phase shall include casual laborers for digging soil test pits, research assistants etc. The value attached to employment opportunities is high given that jobs are scarce. However, these jobs are temporary lasting 1 month or less i.e. of short duration. The severity of the impact is considered low because the jobs are few compared to the many people who would want the opportunity to work. In addition, given the very short period, the impact would not change much of the receptors' welfare or general socio-economic conditions. The extent of the impact is also site specific as workers are normally sourced from the project area. The probability of the impact occurring is high. The magnitude of the impact on job opportunities is therefore assessed as minimal. The overall impact assessment is hence **small positive** and it applies to all the project roads.

Enhancement measures Give priority to the local people in the project areas for available jobs

b. Better standards of living

This impact applies to all roads that will require land acquisition. The sensitive receptors are the envisaged affected persons currently with poor living conditions. If fairly compensated, Project Affected Persons currently living in poor conditions and on small pieces of land may get the chance to acquire bigger pieces of land elsewhere and build better houses, thus better standards of living and social welfare. The value of better standards of living to the receptors is high as it is a general wish for everyone to have improved living conditions. The impact will be long term but will only improve the lives a few people who are in currently in poor living conditions thus local in extent. The probability of it occurring is medium because the design has tried as much as possible to minimize land take and impact on buildings.The magnitude of the impact is thus considered as medium positive. The overall impact assessment is hence **medium positive.**

Enhancement measures
Adequate compensation to enable better standards of living for project affected persons.

7.1.1.2 Negative impacts

a. Anxiety generated by disclosure of information to the Community

This impact will be felt on all project roads and junctions and the sensitive receptors are property owners and traders especially with kiosks and other forms of temporary structures. At this stage, normally there is fear generated in the mind of the public with regard to land acquisition, loss of other property, compensation or the lack of it and related issues like family conflicts etc. During the stakeholders' meetings there was general fear among the stakeholders on issues of compensation, land acquisition, eligibility to compensation etc. However, this impact is normally experienced during the initial disclosure of information before identification of the property owners. However, once information is disseminated to the right people, then the anxiety will be minimized. This impact is local and short term, with a high probability of occurring. The severity of the impact is considered medium. Although the consequences of such fear and anxiety could lead to delay in project implementation, the impact can be mitigated once the information is disseminated to the right people. The magnitude of the impact is thus assessed as medium negative. The overall impact assessment is hence **medium negative.**

Mitigation measures

- To reduce on the anxiety, all information regarding the project and land acquisition and compensation will be thoroughly disseminated to the community especially during the preparation of the Resettlement Action Plan and any other relevant project information throughout other phases of the project so that all fears, anxieties and queries are answered, reduced or eliminated. During the RAP preparation and implementation phases, information about land take and acquisition will be disseminated to the right people e.g. family members – property owners, spouses, children etc.

b. Impact from Relocation of utilities (electric poles, water pipes, etc)

This impact will be felt both before construction and during construction of the roads. It will be felt on all the proposed roads. The sensitive receptors for this impact are the utility owners and the persons along the different roads using the services from these utilities.
Various public utilities like water pipes, sewerage systems and power lines cross or run close to the project roads. It will be necessary to relocate these utilities before commencement of construction. The relocation of these utilities will cause temporary disruption in the services to

the people along the respective roads. In addition, there will be temporary loss of revenue to the utilities owners and the government.

The impact will be short term, local in extent with a low probability of occurrence given that a lot of effort has been considered to reduce the Right of Way for the different roads. The severity of the impact is also considered medium. The magnitude of the impact is assessed as medium negative and the overall impact assessment is **medium positive.**

Mitigation measures

- The Contractor will need to prepare a utility relocation plan and liaise with the utility providers to carry out temporary or permanent relocation, and to protect the utility infrastructure to ensure minimal damage and disruption of services, Damage to the water sources will be avoided wherever possible. If not possible, plans to provide alternative water sources will be made by the implementing agency.
- Consultations with the utility service providers will be commenced right from the design stages to ensure that all the utility services within the alignment are relocated before the commencement of the Works
- Liaise with utility owners to provide early warning to the communitiees about any possible disruption in service provision for the different utilities. Existing communication channels such as phone text messages to consumers, media announcements could be utilised.

7.1.2 Biophysical impacts

7.1.2.1 Positive impacts

No significant positive biophysical impacts are anticipated during the pre-construction phase.

7.1.2.2 Negative impacts

No significant negative biophysical impacts are anticipated during the pre-construction phase.

7.2 Construction phase

7.2.1 Socio-economic impacts

7.2.1.1 Positive impacts

a. Direct employment opportunities

This impact will be felt on all project roads and junctions. The sensitive receptors are the people who will get the opportunity to work on the project. Labour will be required during the

construction of all the proposed roads and junctions. The available jobs will require skilled and non-skilled labour. The unemployment rate in urban areas and Kampala was estimated at 9.5% and 11.4% in 2009/2010 respectively. Provision of jobs to the unemployed would boost their incomes and improve their standards of living. The value attached to direct employment opportunities to the people is high given that employment opportunities are generally scarce. The severity of the impact is considered medium because the work duration will be long enough to positively change the lives of the receptors of the impact. The impact will be short term only during the construction phase and will not satisfy the demand for job opportunities. However, the impact will be regional as many people from other areas will also benefit from the available job opportunities. The probability of the impact occurring is high. The magnitude of the impact on job opportunities is therefore assessed as medium positive. The overall impact assessment is hence **medium positive** and it applies to all the project roads.

Enhancement measures

- Timely and continuous information dissemination about the existing job opportunities and any other opportunities besides the jobs such as sourcing of materials and supplies. The contractor will use effective communication methods so as to ensure that the message reaches the intended people (See section 3.2.3.8 with recommendations on communication channels that reach a wider section of the population).
- The contractor will present a transparent Worker's Recruitment Plan. The recruitment procedures must provide equal opportunity for all including females. The Plan should be clear on the working conditions and terms of employment.
- Employment opportunities will be extended to the interested people along the different roads.
- The Contractor will prepare and implement and Sexual Harassment Policy or Plan so as to avoid any kind of sexual harassment for the workers.
- The Contractor will provide fair working conditions and environment as required by the Employment Act e.g. workers will be allowed to rest, take leave e.g. annual, sick leave, provided with fair pay, contracts etc. The implementing agency will have to approve the Worker's Recruitment Plan including the proposed wages for the workers.
- There will be no forced labour at the project site.
- There will be no child labour at the project site. All employees will be aged 18 years and above as required by the Children's Act.

b. Increased business opportunities

During construction, there will be quite a number of people working on the roads. This will serve as an opportunity for traders to sell their goods and commodities to them e.g. airtime, mobile

money services, food, drinks, basic necessities, construction materials etc. Both men and women will benefit from this impact. The sensitive receptors of this impact will be traders,

The value of the business aspect is considered high. The severity of the impact is considered medium because the impact will change the wellbeing of the receptors and enhance their standards of living. The extent of the impact is regional as people beyond the project will have an opportunity to do business in the project area during construction. The duration of the impact will be short term during construction. The probability of the impact occurring is high. The magnitude of the impact on job opportunities is therefore assessed as medium. The overall impact assessment is hence **medium positive** and it applies to all the project roads.

Enhancement measures
Priority to be given to local companies when outsourcing construction materials.

c. Skills development

Those who will have the opportunity to work on the project during the construction phase, particularly the unskilled and semi-skilled labour will get an opportunity for skill development. The unskilled are likely to be upgraded to semi-skilled while the semi-skilled will be exposed to better techniques and work methodologies etc. Skills to be acquired may include use of construction equipment, operation of heavy materials, health and safety procedures at construction sites, mixing concrete materials and tar, laying drainage, laying pavements, excavating trenches etc. The value of skills is considered high. The duration of the impact will be short-long term. This is because the skills gained during the construction phase will be beneficial in the operation phase as well and the receptors may use the acquired skills to access other employment opportunities thus the severity of the impact will be medium. The extent of the impact is regional as people beyond the project will have an opportunity to work on the project and to apply their skills later on in life. The probability of the impact occurring is medium, this is because, not everyone will gain skills on the project. Some people may only remain with basic knowledge. The magnitude of the impact on job opportunities is therefore assessed as medium. The overall impact assessment is hence **medium positive** and it applies to all the project roads.

Enhancement measures
Provision of on-job training for the workers (unskilled and semi-skilled) in various areas of construction. This could be achieved through deliberately placing unskilled workers with semi-skilled personnel and semi-skilled with skilled workers.

7.2.1.2 Negative impacts

a. Impact on property

This impact will mainly be felt on roads that will require dualling and upgrading or any kind of expansion and junctions that will require expansion. Land and other property such as buildings, trees affected due to the requirement of extra land for construction activities. The sensitive receptors for this impact are land and other property owners; and the people renting the affected structures.

Kampala Capital City Authority, the Design Consultant and the RAP consultant have put a lot of effort in ensuring that the impact on property along the different roads is reduced. Several meetings have been held among the three teams and several design revisions have been made. As a result, there will be few property affected along the different roads. These will mainly be in form of paved ways, ornamental trees, flowers, wall fences and a few few residential and commercial structures.

The value of the aspect is high. The impact on some of the affected property will majorly be short term as the paved ways, flowers and ornamental trees and flowers will be replaced as part of the beautification activity on each road by the contractor. However, for the few people that will lose commercial or residential property, the impact will be long term. The impact on property will be local in extent, the probability of the impact occurring is high. The severity of the impact is medium, as not all property along the different roads will be affected. The magnitude of the impact is thus expected to be medium negative. The overall impact assessment is assessed to be **medium negative.**

Mitigation measures

- A detailed Resettlement Action Plan will be prepared and implemented in accordance with national laws and international guidelines and principles. The Plan will clearly set out the land acquisition and resettlement procedure highlighting all available alternatives for compensation.
-

b. Temporary loss of access to homes and businesses

This impact will be felt on all proposed roads and junctions. The sensitive receptors of this impact are traders and residents along the different roads. The roads being in an urban setting, there are many economic activities carried out along the majority of the roads as described in the baseline chapter. During the construction phase, access to the businesses (e.g. shopping malls, fuel stations, retail shops, open markets, etc.) will be lost temporarily leading to loss of customers.

This will in turn lead to loss of income and disruption in the day to day activities of the affected parties. In addition, there are quite many residential structures whose access is connected to the proposed roads. Access to these properties will be temporarily disrupted. It should be noted that some of the roads are largely industrial and commercial compared to others e.g. 5th, 6th and 7th Streets, Acacia, Sezibwa, Kibuye-Ndeeba-Nateete road, Kayemba road, and a section at the beginning of Nakawa-Ntinda road from Spear Motors etc. Roads with majorly residential places include Tuba road, Kigala, Lungujja and Old Mubende road. Others have almost a balanced mixture of residential and commercial.

The value of the aspect is assessed as high. The impact will be short term but it will affect quite many people along the different roads and its probability of occurrence is high. The severity of the impact is considered medium because despite the changes to accessibility of business premises, business owners will continue to operate their businesses. The magnitude of this impact is therefore assessed as medium negative. The overall impact assessment is **medium negative.**

Mitigation measures

- Handle sections of the road to shorten the period of disruption.
- Access to existing businesses will be maintained by creating temporary driveways, and/or providing alternate access points. Accesses will be restored after construction.

c. Loss/disruption of business, decrease in customers and income

The impact will be felt on all project roads and junctions where business premises will be affected. The sensitive receptors are the business owners and operators and owners of the affected buildings. The businesses to be affected include supermarkets, shops, bars, restaurants, taxi drivers, boda boda riders etc. In addition, boda boda and taxi stages will be temporarily affected as vehicles or boda bodas will cease to park in their current loading stages and off-loading thereby inconveniencing both operators and passengers. Due to the impact on some of the business structures along the roads, the business owners and operators will temporarily lose income before they get alternative business premises. The owners of the premises will also lose income in form of rent. The design has however tried as much as possible to avoid impact on structures on the different roads.

The value of the aspect is high. The impact will be short term for the business operators and owners before they get alternative premises. The probability of it occurring is high. The severity is medium as not all commercial structures along the different roads will be affected. The magnitude of the impact is thus expected to be medium negative. The overall impact assessment is **medium negative.**

Mitigation measures

- Compensate the owners of business premises adequately to enable them replace the buildings before onset of construction activities
- Provide ample time e.g. 3-6 months for the business owners, boda-boda and taxi-operators to look for alternative business premises.

d. Disruption of school activities

This impact will be felt on all roads with schools close to the road. The sensitive receptors for this impact will be the pupils/students and teachers. There are several schools close to the different roads. Heavy earth moving equipment might attract inquisitive children to construction sites. Besides the safety risk, noise and dust from road construction activities and equipment might temporarily disrupt school activities. If due caution is not taken by drivers, haulage trucks and road construction equipment might be an accident risk to school children. The value of the aspect is high. The duration of the impact will be short term, but the impact can have far reaching consequences if not well managed. The severity of the impact is medium as school activities will continue despite the disturbance. The extent of the impact is local. The probability of the impact occurring is also high since quite a number of schools were observed close to the roads. The magnitude of the impact is assessed as medium negative. The overall impact assessment is **medium negative.**

Mitigation measures

- Wherever practical, the contractor will schedule construction near schools on weekends.
- Wherever this risk exists, the contractor will screen off schools to avoid accidents.
- The contractor will engage school administrators to sensitize pupils/students about the risks associated with the road construction and necessary precautions they need to undertake.
- During construction, the contractor should use noise barriers especially on roads near schools, hospitals etc.
- Disseminate information regarding the work plan for construction activities along sections with schools in a timely manner to enable the school administrations make any necessary plans that they may see fit e.g. sensitization of their pupils and students etc.
- Project workers especially drivers will continuously be sensitized and reminded to be extra careful especially when working close to schools.
- Use of flagmen at the construction site near schools to control traffic and reduce noise

levels

e. Influx of people

This impact will be felt on all the proposed roads and junctions. The sensitive receptors of the impact are the people residing and using the project roads including school children. However, the most sensitive areas will be along roads that are already congested, unplanned and with so many activities going on. These include Kibuye-Nateete-Busega road, Wamala road, Sunna I, 8th Street, Kirombe road, Kayemba road.

When construction activities begin, there is a high probability that the project area will experience an influx of an unspecified number of people looking for jobs. Such influx will lead to social impacts on local (host) population including the following: insecurity and theft, competition for existing resources e.g. sanitation facilities and exacerbated waste disposal problems. The population increase and the project activities will have impacts on the community in the following ways.

i. Insecurity and theft

Usually, the influx of new people in a project area comes with all sorts of vices including stealing project materials and equipment. Such unscrupulous people may involve the local community members and project workers in their activities which in the long run might affect the quality of the works. Theft of project materials normally leads to an increase in the project cost and may contribute to project delays. In addition, with more people in the area, the crime rate might become even higher. This impact will mainly be felt on roads that are congested with many informal businesses e.g. Kibuye-Nateete-Busega road, Ssuna I road, Wamala road and Kayemba road.

ii. Competition for sanitation facilities and exacerbated waste disposal problems

Waste disposal in Kampala and Wakiso is currently a major challenge and is a threat to sanitation and the health of the people in the city (Section 3.2.3.9b). There are no proper waste disposal facilities for the people along most of the roads. With the project work force, it is likely that the problem of waste disposal and littering of rubbish anyhow will be exacerbated. Furthermore, sanitation facilities are mainly privately owned which will make access to them almost impossible and thus contributing to the already poor sanitation problem in the project area. All this may lead to an outbreak of hygiene related diseases like diarrhea and cholera.

iii. Increase in HIV/AIDS and other diseases

HIV/AIDS aspect and other social infections are concerns for every construction project associated with interactions among construction workers and the local communities. Workers tend to be tempted to engage in sexual relationships with women and young girls in the project area. In addition, prostitutes may be attracted to the area due to the presence of workers who are usually perceived to possess a lot of money. The construction phase of the roads is therefore likely to increase the risk of STDs including HIV/AIDS to both workers and the communities. In addition, malaria was identified as a major cause of morbidity and mortality in the project area. Construction activities are usually associated with creation of stagnant pools leading to breeding in some places for mosquitoes.

iv. *Conflicts and grievances*

Like many construction sites, it is likely that conflicts and grievances will arise between the residents (directly affected and indirectly affected) road users and project workers. Conflicts and grievances that may arise will be as a result of workers luring away married women and school children, compensation related, others may be construction related like, dust, flying stones, and blockage of access to homes and businesses among others. Lack of proper channels to handle grievances from the different stakeholders may cause delays to project activities and thus increase the cost of the project.

The impact of influx of the people in the project area will be short term only during the construction phase. The severity of the impact will be medium because it is expected that the impact will be felt mainly during day because the proposed roads are located within Kampala and its outskirts and Wakiso. The project workers can easily commute from their residential areas daily to the project sites thus reducing the level of impact during night. The probability of the impact occurring is high. The extent of the impact is regional. The magnitude of the impact of influx of people is considered to be medium negative. The overall impact assessment is **medium negative.**

Mitigation measures

- Information dissemination to the interested communities and local leaders along each road about the available jobs.
- Recruitment of local people for the less specialized activities, wherever possible.
- Put in place an internal control system to curb cases of theft of materials
- Collaborate with the local security in the area to ensure safety of project materials
- The contractor will have a code of conduct for its workers to minimize some of the risks.

- A Grievance Management Plan will be prepared and implemented by the Contractor for use by the concerned parties. Local authorities at Sub County and village levels will be involved in the solving of grievances. As a minimum the Grievance Resolution Mechanism / Plan will consist of a clear point of contact to receive the grievances, responsible persons to solve the different categories of cases and proper and clear channels for feedback.
- The contractor will provide adequate sanitation facilities for workers on each road. The project being linear in nature, the distance between these facilities will be short to avoid workers trekking long distances to access them.
- A Waste Management Plan will be in place and implemented by the contractor with strict supervision from KCCA.
- The Contractor will have a comprehensive HIV/AIDS Management plan for its workers informed by a baseline so as to reduce the risk of spreading the disease e.g. provision of condoms, free testing and counselling services, HIV/AIDS awareness programs etc.
- HIV/AIDS awareness programs on radio or television plus any other methodology to disseminate the information to the community. An independent NGO will be procured by KCCA to carry out the awareness.
- Minimize stagnant pools of water as much as possible by ensuring that trenches are not left open for a long time.
- Prepare and implement a Stakeholder and Citizen Engagement Plan to help in the management of community expectations and any other issues that may arise.
- The contractor will have a comprehensive social management plan informed by a baseline and stakeholder engagement to manage social vices both for local and international staff
- Contractor will ensure that there are toilet facilities on site for both males and females
- Contractor will ensure that no children are employed on site.

f. Impact on vulnerable groups

The results from the socio economic survey indicated that there were households headed by vulnerable people along all the proposed roads e.g. the elderly, the disabled, the widowed, children below 18 years etc (Section 3.2.3.12). The sensitive receptors of this impact are mainly vulnerable groups who may be recruited by the project and those who may lose property due to construction activities. Unless properly protected, they will be disproportionally affected by the negative impact of the project such as physical and economic displacement, disruption of social networks, discrimination etc. This may lead to psychological torture, hardships and suffering etc. for the vulnerable people. Vulnerable people may also be exploited due to their vulnerable nature and the lack of proper means to protect themselves. In some cases children who are supposed to be at school may be used by the contractor as cheap labour. The duration of the impact will be

short term although the resultant effects of the impact could be long term. The extent of the impact will be local, the severity will be medium because there no major displacements are expected as the design tried as much as possible to avoid buildings and strict measures against gender exploitation, sexual abuse, child labor will be spelt out in the Contractor's Contract. The probability of the impact occurring is also considered to be medium.The magnitude of the impact is thus considered medium negative and the overall impact assessment as **medium negative.**

Mitigation measures

- Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly.
- The affected vulnerable households will be compensated fairly and adequately.
- Livelihood restoration strategies will be extended to the vulnerable groups and their income levels monitored closely during the implementation process.
- Equal distribution of jobs to all including vulnerable households.
- There will be no forced labour or child labour at the project site. All employees will be aged 18 years and above. Furthermore, employment records will be disaggregated by age and sex.

g. Impact on gender

The sensitive receptors of this impact are mainly the women and girls because generally these bear the greatest and most direct costs of gender inequalities. Below are the expected gender impacts:

Women are likely to be least favored in the employment opportunities in the project area. This is because the nature of jobs available during construction is perceived to be done mainly by men. In addition, there is likely to be developments of relationships between workers and the women of the area that are either engaged or already married, which can result into marriage break ups and disintegration of families.

Furthermore, there is likelihood of sexual harassment especially from the male workers on the female workers or young girls and women staying in the vicinity of the construction sites. Acts of sexual assault harassment may include unwelcome sexual touching, sexually suggestive or degrading remarks and sexually explicit or abusive language, rape or defilement among others. This kind of behavior is highly undesirable and unacceptable. It may cause psychological torture to the victims which may lead to permanent damage to their self-esteem. In addition, it may lead to early pregnancies for young girls, increased school dropouts and sexually transmitted diseases.

Immorality could also result especially with the young girls of the area in efforts to gain favour for employment opportunities, this can result into spread of sexually transmitted diseases such as HIV/AIDS and other sexually related diseases.

Although the impact on gender will happen during the construction phase (short term), the resultant negative effects of the some of the impacts like HIV/AIDS, marriage breakups, increase in girl child school dropout etc. will be long term and permanently affect the victims. The extent of the impact will be regional because it is expected that women from other areas will seek employment opportunities on the project.

The baseline findings on education showed that many women in the project area have high education levels and can equally compete for the available jobs. In addition, although the impacts of sexual assault and harassment, family breakups and increased sexually transmitted diseases can lead to long term effects, mitigation measures can be put in place to reduce the magnitude of the impact. The probability of this impact occurring is medium. The magnitude of the impact is thus assessed as medium negative and the overall assessment as **medium positive.**

Mitigation measures

- Jobs will be equitably distributed to both women and men as long as one has the qualification rather than basing on gender to allocate jobs. Employment records disaggregated by sex will kept by contractor and easily accessed by the monitoring and supervising team.
- Information dissemination about dangers of HIV/AIDS to the community will be done all throughout the period of the project. The messages will be passed on using the locally understood language for better understanding and the main means of information access to make them effective.
- Workers will be sensitized to desist from any sexual relations with the local people to avoid cases of family break ups.
- A Sexual Harassment Policy will be developed by the Contractor before start of the construction and its contents distributed and disseminated to all workers. This plan will include items like; key point of contact e.g. Human Resource Manager, Health and Safety Manager or Community Liaison Office; procedure for reporting, incident referral plan, mitigation measures and penalties to the culprits etc.
- Prompt and effective remedial action will be taken after investigating the sexual harassment claims.
- Sensitisation of employees and supervisors about sexual harassment will be undertaken at the beginning of the construction so as to avoid any possible sexual harassment. In addition, continuous reminders will be made from time to time.
- Display clear and visible posters on reporting channels at the respective construction

offices and along the several sections of the roads where construction is taking place.

h. Disruption of traffic

Traffic will be disrupted on all the roads and junctions under construction. The impact will mainly be felt during peak hours. The sensitive receptors of this impact are the road users and people residing and operating along the different roads. Transportation of feacal matter by KCCA to the treatment plants in Bugolobi and Lubigi will also be affected thus contributing to an increase in public health related issues. Given the urban nature of the roads, there is not enough space to create alternative routes for continuous traffic flow. This will cause delays for road users rushing to work and going to other destinations. In addition, pedestrians' moving along the roads will also be largely inconvenienced.

The impact will be short term i.e. during the construction phase only and the probability of its occurrence is high. The extent will be national because the road users also include people from other areas outside the project area. The severity of the impact will be medium-high. The magnitude of the impact is thus assessed as medium negative and the overall impact assessment as **medium negative.**

Mitigation measures

- A Traffic Management Plan (TMP) will be developed and implemented during project construction. Specific elements of the TMP will include but not limited to the following: the use of flaggers and temporary lane realignments to maintain through traffic, concrete barriers, signage to direct traffic movements, and possible reduction of speed limits in construction zones. It will aslo include a description of measures to be taken to protect pedestrians and community health and safety mitigation measures
- Traffic can be accommodated by means of stop/go conditions in partial-width construction wherever possible.
- Inform road users about location of road works and advise on use of alternative existing roads
- Coordination with traffic police in traffic management
- Deployment of flag men to control traffic flow at all project sub component sites

i. Disruption of public utilities and infrastructure

This impact will be felt on all the proposed roads. The sensitive receptors for this impact are the utility owners and the persons along the different roads using the services from these utilities.

Various public utilities like water pipes, sewerage systems and power lines cross or run close to the project roads. During construction, these utilities are likely to be affected by the construction activities. The water pipes and other lines will be disrupted making the service unavailable to the host population. For instance, Airtel lines cross New Port bell road at 0+900km, water pipes cross Old Portobello road between 0+400 – 0+500km, a sewer pipe crosses the same road between 1+800 – 1+900km etc. Along Wamala road and Kisaasi 2 road, a community water source close to the road were noted.

Disruption of these services will cause stress and inconvenience to the consumers and financial loss to the utility companies and people utilizing them for business purposes. In regard to the impact on water supply, residents along Wamala road, along the section towards Kampala University are considered vulnerable because they mainly rely on the protected spring that will be affected with an alternative spring located about 1km or more away. If no alternative water supply is provided for them, they will have to walk longer distances to access a free water source.

The impact will be short term, local in extent with a high probability of occurrence. The severity of the impact is also considered medium. The magnitude of the impact is assessed as medium negative and the overall impact assessment is **medium negative.**

Mitigation measures

- The Contractor will need to prepare a utility relocation plan and liaise with the utility providers to carry out temporary or permanent relocation, and to protect the utility infrastructure to ensure minimal damage and disruption of services, Damage to the water sources will be avoided wherever possible. If not possible, plans to provide alternative water sources will be made by the implementing agency.
- Consultations with the utility service providers will be commenced right from the design stages to ensure that all the utility services within the alignment are relocated before the commencement of the Works
- Liaise with utility owners to provide early warning to the communitiees about any possible disruption in service provision for the different utilities. Existing communication channels such as phone text messages to consumers, media announcements could be utilised.

j. Occupational Health and Safety

The sensitive receptors of this impact are the project workers. Although the number of workers per road is not yet determined, it is clear that quite many people will be employed during the construction of the different road links and junctions. The workforce will be made up of more semi-skilled and unskilled laborers compared to the skilled workers. Consequently, most times the

workers are not aware of the safe operating procedures while undertaking their assignments. It is likely that the limited exposure might increase the likelihood of occurrence of occupational accidents.

Construction activities will include site preparation, the construction of pavement layers, preparation of bitumen, extraction of materials for road construction etc. Risks and accidents could be as a result of the following;

- Trip and fall hazards
- Exposure to chemicals, hazardous or flammable materials;
- Flying objects
- Exposure to physical hazards from use of heavy equipment
- Exposure to dust and noise from construction activities such as excavation works, haulage vehicles delivering construction materials on site and transporting waste material off site, extraction rock for construction, construction machinery (bull dozers, caterpillars, concrete mixers, graders, and excavators) and supporting machinery such as generators etc. if ill-serviced.
- Exposure to electrical hazards from the use of tools and machinery
- Accidents from vehicular traffic
- Accidental burst of sewage pipes during the relocation of public utilities. This could lead to impacts like; bad odour for the workers, flying particles from the pipes in case the pipes are metallic.

The value of the aspect is high. Although the impacts if not mitigated, can result in death and permanent disability for the victims, they will be short term as they will occur during the construction phase only. The probability of occurrence is medium and the severity of the impact would be high if it occurred. The extent of the impact can be international. The magnitude of the impact is thus considered as medium negative and the overall impact assessment as **medium negative.**

Mitigation measures

- An Occupational Health and Safety Management Plan will be put in place by the contractor before commencement of the project and will implement its provisions. The Safety Plan will put into consideration the safety procedure in case of accidental bursts of sewage pipes. Workers will at all times wear PPE.
- Contractor to work in close collaboration with NWSC in the event that sewage pipes break or to minimize the possibility as much as possible.
- Disseminating of relevant safe working procedures to all workers
- Provision of appropriate Personal Protective Equipment to the workers e.g. ear muffs,

overalls, nose masks, helmets, safety boots, safety jackets inconjunction with training, use, and maintenance of the PPE.

- Labelling of danger zones and hazardous materials
- Restrictions/control of access to potential danger zones or usage of hazardous chemicals
- An Emergency Response Plan /Contingency Plan taking into consideration all emergencies will be prepared before the commencement of the project. This will be communicated to all workers.
- All construction equipment used for the execution of the project works will be fit for purpose and carry valid inspection certificates and insurance requirements.
- Risk assessment will be prepared and communicated prior to commencement of work for all types of work activities on site.
- Ensure all plant machines and vehicles are regularly inspected, serviced and maintained. All staff assigned to operate project machines and vehicles will be trained and competent for such a job.
- First Aid kits with the relevant medicines and equipment e.g. adhesive bandages, antibiotic ointment, cotton wool, pain killers, non-latex gloves, scissors, thermometer, etc. will be made available by the contractor on site.
- An accident log will be put at each construction site to record and monitor any accidents.
- Wear visible apparel to reduce on the risk of accidents due to poor visibility.
- Prepare a Site Traffic Management Plan at worker' camps clearly showing visibly marked pedestrian walkways and parking for project vehicles to avoid any traffic accidents at workers' camp.
- Inform and apply site procedures to visitors to the site.
- Regular vision tests for drivers. Regular impairment testing for drivers (drug, alcohol).
- Regular inspection to ensure the implementation of the recommendations / provisions of the Management Plans and assessment of compliance with the requirements.
- Regular reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again.
- High noise producing machinery will be fitted with silencers
- Noise intensive works such as excavation, movement of project vehicles will be scheduled for the least noise-sensitive time of the day (work between 7:00am to 6:00pm) since the noise impact is less felt during day than during the night.
- Limit the speed of project vehicles to 30km/hr. to help minimize the increase in noise levels. To ensure adherence to the set speed limit, speed humps will be put in place where necessary along construction routes and penalty systems introduced.
- Since the impact of noise increases with increase in exposure time, the work schedules for workers will also be designed to limit the exposure time. No worker will be exposed

to noise level greater than 85dB (A) for a duration exceeding 8 hours per day as stated in the National Environment (Noise Standards and Control) Regulations, 2003.

- Conduct Environmental Impact Assessments for material extraction activities

k. Community Health and Safety

This impact will be felt on all proposed roads and the junctions that will be widened and on sites where construction materials will be sourced. The sensitive receptors are communities, businesses and institutions along the different roads and material source sites.

Like any development project brought in an area, it is likely that a considerable number of people will be attracted to the construction site. These will include both the job seekers from outside the project area and the local residents in the neighboring villages and trading centres. The construction of the project facilities will introduce machinery and other equipment such as vibrators, graders, trucks, rollers/compactors, excavators, concrete mixers etc. There will be increased traffic and population influx and its associated effects. The likely community health and safety hazards include:

- Dust
- Noise and vibration from construction vehicles and other machinery, material extraction activities
- Communicable diseases associated with the influx of temporary construction labour
- Accidents and injuries
- Accidental burst of sewage pipes during the relocation of public utilities. This could lead to impacts like; bad odour for the surrounding community, damage to property.

The value of the aspect is high. The duration of the impact will be short, and the probability of its occurrence is high. The severity of the impact is rated high because of the high inconvenience it will cause the public and for those who will have contracted communicable diseases like HIV/AIDS or accidents the impact will be irreversible. The extent of the impact will be regional because it will also affect people from outside the project area. The magnitude of the impact is assessed medium negative and the overall impact assessment is **medium negative.**

Mitigation measures

- Use of road signs & barriers to show the dangerous areas
- Enforce restrictions on unnecessary entry into any protected zones
- Follow the mitigation measures prescribed to reduce any dust impacts e.g. regular sprinkling of water along the roads like twice a day etc.).

- The Contractor will have an HIV/AIDS Prevention Plan for his workers and also implement it so as to reduce the risk of spreading the disease.
- Make provisions for pedestrian and non-vehicular traffic during construction periods.
- Use of flagmen to direct the traffic to avoid any accidents.
- Constant sensitisations and reminders to workers and drivers about community health and safety e.g. traffic rules etc.
- Work in close collaborations with Trafifc Police to enforce traffic rules and regulations along the roads under construction.
- All project vehicles and trucks will comply with the proposed speed limits i.e. 30-50 based on the road.
- The contractor to ensure that all project trucks and vehicles are operated by licensed operators.
- The Contractor to be extremely careful when relocating sewage pipes to avoid any accidental sewage bursts and their impacts to communities.
- The Contractor will work closely with NWSC so as to ensure that risks associated with breaking of sewage pipes are minimised.
- Enhance community liaison for timely gathering of all the related community health and safety issues arising from project implementation
- High noise producing machinery will be fitted with silencers
- Noise intensive works such as excavation, movement of project vehicles will be scheduled for the least noise-sensitive time of the day (work between 7:00am to 6:00pm) since the noise impact is less felt during day than during the night.
- Conduct Environmental Impact Assessments for material extraction activities

l. Damage to buildings due to material extraction

Extraction of materials specifically rock and gravel from quarry sites may pose damage to buildings within the neighbourhood of the sites. The receptor for this impact are the people living in the houses that may be damaged. This impact will mainly be felt on sites which are located in the settlement areas in particular Seyani Stone Quarry. Due to heavy machines used during stone blasting, in the due process structures or houses may crack or even break/collapse hence endangering the lives of the people at community as well. The value of the aspect is assessed as high. The severity of the impact would be low. The impact would be site-specific. The impact would be short-term. The probability of the impact is high. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is small negative.

Mitigation measures

The supplier or contractor will rehabilitate a cracked building or build a new one in case of collapse and offer health aid to any affected victims.

m. Impact on Physical cultural resources

Introduction

Physical cultural resource impact assessment has been undertaken to define the nature and scale of potential impacts on cultural heritage resources associated with the Project, with a specific focus on the effects in the vicinity of sensitive receivers. The only impact anticipated on direct impact zone is accidental unearthing of archaeological remains that may lead to their loss or permanent displacement due to land take and land disturbances during construction activities. To this juncture the project impact is estimated to be localized for the anticipated negative impact mentioned above. There is also a high probability not to encounter physical cultural resources, most of these roads and junctions are in use to date. The impact severity is expected to be **low** since no declared or recorded archaeological and paleontological sites or archaeological potential areas identified within zone of influence of the project. The overall impact of the project on physical cultural resources is evaluated as ***small negative.***

Impacts on physical cultural resources due to land take

Construction activities may result in damage to or the loss of cultural heritage and archaeological assets or paleontological materials. However, there is no declared and or recorded archaeological and paleontological sites or archaeological potential areas identified within zone of influence of the project (Table 27). The construction of roads and junctions will not impact on areas of archaeological and cultural interest directly. It should be noted that archaeological and paleontological resources mostly are buried underneath, they may therefore be degraded and displaced unknowingly (chance finds) as most works will involve excavations. Chance finds may lead to displacement or relocation of unknown buried archaeology. The value of the resource is high. The severity of the impact would be low. The extent of any adverse effects would depend on the location of the component activities and the heritage characteristics of the area affected (i.e. evidence of past finds of archaeological significance, concentration of features/structures of heritage importance, etc.) The duration would be permanent. The probability of occurrence is low. The magnitude is minimal. The overall impact significance is therefore assessed **small negative.** The impact is applicable to all roads to be dualled where excavations will be conducted outside the existing road alignments and to sites where road construction material such as gravel and stone will be excavated.

Mitigation measures

- Construction workers and managers will be trained on basic skills of how to identify and handle archaeological materials/artefacts before commencement of work.
- All ground disturbing activities during construction of the proposed facilities will be monitored by a qualified archaeologist.
- Any cultural resources (chance finds) discovered during construction will be tested to determine significance and mitigated through avoidance or data recovery.
- Any artefacts or fossils (*Chance Finds*) impacted during construction will be repaired by the archaeological monitor to a point of identification.
- During constructions the contractor will mark the buffer zones to minimise any damage.
- In case of chance finds during construction activities, the Chance finds procedure below will be followed;
    - Temporarily stop work in the vicinity (only if potential chance find) there after supervisor/project manager should be notified. Temporary site protection measures and access restrictions will be set.
    - Archaeologist/Cultural resource officer will perform a preliminary evaluation to determine whether the **Chance Find** is cultural heritage and if so, whether it is an isolate or part of a larger site or feature. Artefacts will be left in place when possible; if materials are collected they will be placed in bags and labelled by Archaeologist/ Cultural resource officer and transported to appropriate place. No project personnel are permitted to take or keep artefacts as personal possessions.
    - Documentation of **Chance Find** through photography, notes, GPS coordinates, and maps (collect spatial data) as appropriate will be done. If the Chance Find proves to be an isolated find or not cultural heritage, the Archaeologist/ Cultural resource officer will authorize the removal of site protection measures and activity in the vicinity of the site can resume.
    - However, if the Archaeologist/ Cultural resource officer confirms the **Chance Find** is a cultural heritage will inform Kampala Capital City Authority who will inform the Department of Museums and Monuments. The discussions on how to go about treatment will be organized. If mitigation is required, then expedient rescue excavations will be undertaken by the specialist.
    - While investigation is ongoing, co-ordinate with on-site personnel keeping them informed as to status and schedule of investigations, and informing them when the construction may resume.
    - Lastly, prepare and retain archaeological monitoring records including all initial reports whether they are later confirmed or not. The record will include coordinates of all observations to be retained within the project's GIS

system/points.

Interruption/ Disturbances to intangible heritage resources

Some cultural practises will be disturbed and or displaced by the project activities. Most of these activities are conducted around or in surroundings in people's daily life. This is directly associated with the use of tangible heritages that are located in people's settlement settings. Impacts to intangible cultural heritage are caused when socio-economic changes and involuntary resettlement cause the loss of traditional knowledge and / or practices that may serve important functions for local communities. Examples of potentially affected heritage include: traditional practices such as, beliefs, sacrifices, and prayers or rite of passage. This is measured either through extent of physical damage, the level of disturbance of the site's function or the duration and severity of interruption of site use and accessibility to the site. The value of the resource is high. The severity of the impact would be low. The extent would be local. The duration would be permanent. The probability of occurrence is low. The magnitude is minimal. The overall impact assessment is **small negative.**

Mitigation measures

- Maintaining understanding of and respect for cultural norms (religion, social organisation, rituals, forms of cultural expression, traditional techniques and activities).
- Instituting mechanisms to ensure community cohesion to preserve their cultural heritage during construction and post construction phases

Impact on Historical Monuments/Built Heritages

The cultural heritage historic/monument built environment can be damaged by the deposition of chemicals arising from vehicle and other machines' emissions. The historic built environment can also be damaged by construction activities and vibration arising from construction vehicles and other machines. However, the recorded historical monuments are found outside immediate project zone. The impact is applicable to Lukuli and its 1 junction (Kayemba-Lukuli), Kirombe and its 2 junctions (Kabega Gogonya and Gogonya- Nsambya Estate road junction), Kabega and its 1 junction (Hanlon-Kabega), and Kayemba and its 1 junction (Kayemba- Katwe), Tuba, Kulambiro Najeera and Kulambiro ring roads and Buwambo/Kiteezi where historic built environment e.g graveyards and places of worship were recorded (Table 27). The value of the resource is high. The severity of the impact would be low. The extent would be regional. The duration would be permanent. The probability of occurrence is low. The magnitude is minimal. The overall impact assessment is **small negative.**

Mitigation measures

- Implementation of proposed mitigation measures for impacts on air quality and increase in noise level.
- Discussions will be held with project affected persons for any graveyards to be damaged on how best to handle the situation.
- Any built environment affected by the project activities will be repaired or rebuilt.

7.2.2 Biophysical impacts

7.2.2.1 Positive impacts

a. Increase in fauna (bird) species diversity

Although some species would move out of construction sites due to habitat alteration, other common generalist species such as the Shikra and Splendid Glossy Starling that are resistant to disturbance can easily come in the site, leading to increase in species diversity. This usually happens in sites with minimum disturbance and suitable generalist habitat structure. This impact would be applicable to all roads and junctions since there will be some level of disturbance on all. The value of the birds is low considering that the birds that would move into disturbed sites are usually common and are not of conservation concern. The severity of the impact would be low. The impact would be permanent, local. The probability of the impact is medium. The magnitude of the impact is therefore assessed as medium. The overall impact assessment is small positive.

Enhancement measures

- The construction crew will live in harmony with birds seen in the construction areas as far as possible for example by not injuring them in any way.
- Trees/vegetation to compensate for the habitat degraded by the Works will be replanted

7.2.2.2 Negative impacts

a. Loss of plant species and degradation of habitats

A number of plant species were recorded by the sides of roads and junctions. Some of these species play important roles. For example, species such as *Cyperus papyrus, Phoenix reclinata, Phragmitis mauritianus* recorded in some of the wetlands noted by the roads play important roles such as flood control, ground water recharge and discharge, and water purification. Many species recorded e.g *Mangifera indica, Psidium guajava, Persea Americana, Artocarpus heterophyllus* and crops in home gardens are a source of food to man and birds. Other species are of commercial purposes such as eucalyptus and pine, ornamental value such as *Grivellea robusta, and Jacaranda mimosifolia*,

medicinal value and provide resting, hiding and breeding habitat to birds and other organisms. Clearing of vegetation for expansion of roads to be dualled will lead to loss of some of these species and consequently loss of their values, functions and integrity of their habitats.

In addition, some of the species recorded including *Jacaranda mimosifolia, Hallea stipulosa, Maesopsis eminii, Canarium schweinfurthii, Brugmansia suaveolens, Hallea rubrostipulata, Juniperus procera, Khaya anthotheca, Milicia excelsa, Podocarpus* sp*, and Tamarindus indica*, are of conservation concern facing a high risk of extinction due to their importance in the ecosystem. Clearing of vegetation for expansion of roads to be dualled will lead to loss of some of these species. The loss of the species would increase their risk of extinction and lead to loss of the species' value.

Vegetation clearance under areas where any workshops, workers camps, equipment and material storage sites, access roads and new borrow pits to be established will lead to loss of plant species therein.

Plant species would not only be lost or damaged due to clearance of vegetation by the road sides but also due to the following;

- Stockpiles of earth from road cuts and bitumen spills deposited on the plant species.
- Vegetaion clearance for material extraction at borrow reas and quarry sites
- Dust and flying stones especially at quarry sites and stone crushing plants.
- Creation of temporary diversions for diverting of traffic during construction.
- Activities like culvert extensions, channelisation and filling within wetlands to lead water to culverts which may alter the flow direction of water depriving some wetland plant species of water.
- New plant species that are not water dependent emerging under areas deprived of water due to the aforementioned activities.

The impact of loss of plant species and subsequent degradation of habitats is significant for only those roads slated for dualling specifically Port bell Road, Spring road, Nakawa Ntinda road and Acacia Avenue that have species of conservation concern or ecologically sensitive habitats including wetlands and streams by their sides.

The value of the plants and habitats has been assessed as medium for Port bell road, Spring road, Nakawa Ntinda road and Acacia avenue since some of the plants on those roads are species of conservation concern and some of the habitats on the roads (Port bell and Ntinda-Nakawa roads) are of medium to high value (Section 3.2.2.1.4d and 3.2.2.1g). The severity of the above impact is rated low considering that the area to be cleared for the new road lanes is quite small (<20m wide

corridor) with generally little vegetation cover. Natural functions and processes supported by the cut down plant species would be minimally affected. The impact would be local. The impact would be permanent. The probability of the impact is high since there will be definite clearance of vegetation for the roads to be dualled. The magnitude of the impact is therefore assessed as medium. The overall impact assessment is **medium negative** for Port bell road, Spring road, Nakawa Ntinda road and Acacia avenue and **minimal** for other roads and junctions.

Mitigation measures

- Before vegetation clearance, the corridors to be cleared will be clearly marked out to avoid unnecessary vegetation clearance. In addition, clearing will be done manually where possible and will not be done indiscriminately. Trees that have to be felled will therefore be marked before clearance commences.
- Species of conservation concern will be avoided by designing new road lanes on road sides without the species. However if they cannot be avoided then permission to clear those listed by NFA will be sought from responsible authorities as stated in the law. Also if cleared, the tress will be replanted by the road or junction sides and their regrowth monitored and enhanced until they are mature.
- A deliberate campaign will be made beforehand to sensitize all the construction and other workers on the project about the need to minimize damage on plant species. This awareness raising drive will be carried out prior to any operations in the project area.
- New road lanes will be placed on the side of the roads that have no wetland/stream or on wetland sides that are more degraded with human activity such growing of crops, trees, and waste disposal
- All persons losing crops and trees will be adequately compensated.
- Tree clearance will be compensated by tree planting where space provides an opportunity.
- In addition, to avoid the impact from becoming significant beyond boundaries of roads mentioned above, the following will be implemented;

✓ Spilling of bitumen that would damage vegetation will be avoided;
✓ Creation of new diversion roads will be avoided by using existing roads as diversions where possible;
✓ Stone crushing plants will be fitted with dust control devices and operated in accordance with manufacturer's specifications;
✓ Workshops, equipment storage facilities and workers camps, will not be put in areas of special conservation value such as forest reserves and wetlands;
✓ Areas which will minimize vegetation loss will be selected for access routes, construction workshops, equipment and materials' storage sites and workers' camps;
✓ Stockpiles of earth will not be placed where there is vegetation, particularly on young

plants which have been planted deliberately.

- ✓ All areas cleared of grass will be revegetated just after decommissioning.

b. Proliferation of invasive species of plants

Invasive species tend to spread prolifically thereby disturbing the natural equilibrium of plant growth. They usually suppress the native flora, thus changing the structure and composition of the vegetation. The species diversity of the affected area declines as a result. A number of invasive species were observed by the project roads and most of the junctions. These invasive species can be transferred to areas outside their current locations through movement of equipment or transfer by workers. Invasive species not currently in the project area may also be brought in through the equipment to be used.

Also, earth brought in from borrows pits and quarries for filling during road construction may bring in new species into the project area. Wetland areas deprived of water through channelization may be covered by new water independent plant species. These species if invasive may out-compete the existing plant species and over take them. This impact is applicable to all roads where large or relatively large expanse of natural vegetation was observed including Sir Apollo Kaggwa road, Kabuusu-Kitebi Bunamwaya road, Kulambiro Ring road, Nakawa Ntinda road, Accacia Avenue, Muzito road, Lukuli road, Ntinda-Kisaasi road, Katalima road, Mugema road, Kirombe road, Buwambo/Kitezi road, Tuba road, Wamala road, Old Mubende road, Ssuna road 1 and Kulambiro-Najeera road.

The value of the receptors (plants) has been assessed as medium due to existence of some species of conservation concern by the roads. The severity of the above impact is rated high considering that a replacement of species with invasive species may totally eliminate the values of the replaced species. The impact would be regional (district wide) if proposed mitigation measures are not implemented. The impact would be permanent if proposed mitigation measures are not implemented. The probability is high since due to presence of invasive species in the project area. The magnitude of the impact is therefore assessed as Large. The overall impact assessment is **large negative** for the roads to which it is applicable and minimal/non-existent for the other roads and junctions.

Mitigation measures

- Construction equipment brought in from outside the project area will be cleaned to minimize the risk of introducing invasive species from outside the project area.
- All equipment will be cleaned thoroughly before demobilization out of the project area.
- Awareness of the workers and neighbouring communities about the dangers and threats

invasive species can potentially pose to ecosystem stability will be enhanced.

- Any non-paved disturbed areas will be restored immediately after the operations. This will allow natural regeneration to take place so that the disturbed areas may be re-vegetated with natural vegetation immediately after the construction activities
- Growth of invasive species of plants within the proximity to the roads will be monitored and any that may grow in the area mechanically removed, preferably before they begin flowering/fruiting stage
- During channelization, the flow direction of water within wetlands will as much as possible be maintained
- Borrow material from quarry or borrow pits will be obtained from within the project area as much as possible.
- Earth for filling during road construction will be obtained from bare/almost bare ground to minimise on the seed banks that would be carried along with it.
- Immediately after construction, road edges cleared of vegetation will be planted with plant species indigenous to those areas and their regrowth monitored until they are mature

c. Impacts on Fauna

Although the proposed areas are all already modified by human settlement, they still hold a diversity of fauna especially birds. This is because of the diversity of habitats provided by the vegetation structure of the areas. Vegetation types similar to the forests structure especially with wetland mosaics are generally known for their high biodiversity value (Bennun *et al.*, 1996, Bennun 1997, IUCN 2013). Since birds prefer different habitats as indicated by their various classifications (Bennun *et al.*1996) as do mammals, the more habitat types maintained in an area, the more fauna diversity supported. Therefore, altering the habitat of a site implies that the species composition of that site is affected. It is anticipated that since this project involves improvement of already existing roads, not much human and fauna displacement will occur. If that is the case, then the potential impacts to the fauna diversity will be minimal. With that background, the major potential impacts of the proposed road improvement project to fauna species (mammals and birds) are presented below.

i. Displacement of fauna species

Issues related to habitat destruction (e.g. cutting down of trees) especially under roads to be dualled (*Nakawa Ntinda, Bukoto-Ntinda, Acacia Avenue, Portbell road, and A109)* may lead to displacement of species.

The value of the fauna species on Portbell road has been assessed as medium since 7 of the species registered on that road were species of conservation concern. It is assessed as low for fauna species on the other roads to be dualled considering that they were not species of conservation concern. The severity of the above impact is rated low considering that the area to be cleared for the new road lanes is quite small (<20m) with generally little vegetation cover. Species displaced would easily find refugee in any neighbouring habitats not affected by the project foot print. Natural processes functions and processes supported by the species would be minimally affected. The Impact would be site specific, within 1 km radius of the affected sites. The impact would be short term as species would quickly find refugee in neighbouring habitats not affected by the project. The probability of the impact is high since there will be definite habitat destruction on the roads to be dualled. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative** for all roads to be dualled and non-existent for roads that are not to be dualled and all junctions if trees are avoided.

Mitigation measures

- Cutting down of big trees and draining of wetlands outside the road alignment which are main habitats for biodiversity will be minimised. Sentitive areas like woodlots and wetlands and major thickets will be avoided during construction.
- In cases where the sensitive habitats cannot be avoided, a plan to create these habitats will be put in place. For example if for unavoidable reasons, one tree is cut down, three more trees at the road side to replace the destroyed habitat will be planted. And if the wetland is to be drained a section of it will be left to service the remaining ecosystem.
- Recovery of such areas (woodlots and wetlands) if affected during construction will be monitored.
- Any roosting or breeding sites encountered during construction will be avoided or evacuated by specialised experts if possible.
- If the habitat is recovered after a short time, species can easily return to the regenerated suitable habitat. The project time will therefore be kept at the minimum to ensure quick recovery and re-colonization of the sites.
- Deliberate planting of trees and grass along certain road side areas will be undertaken. Creeping grasses such as *Cynodon dactylon* whose stems easily establish and cover large surfaces and *Sporobolus pyramidalis* will be planted on the edges of the roads. This will encourage the return of biodiversity which might have been displaced or indeed to keep those species that will have remained for reasons like their being resilient to disturbances, ability to hide, or to avoid disruption by road works.

ii. Reduction in number of fauna species

The construction of new additional lanes for roads to be dualled will lead to habitat alteration, during site clearance. Nesting sites on trees may also be destroyed during expansion of some of the roads. Alteration in habitat could lead to a reduction in the number of species resulting from unsuitable habitat and low food availability. The impact is applicable to roads to be dualled (Nakawa Ntinda, Bukoto-Ntinda, Acacia Avenue, Portbell road, and A109).

The value of the fauna species on Port bell road has been assessed as medium since 7 of the species registered on that road were species of conservation concern. It is assessed as low for fauna species on the other roads to be dualled considering that they were not species of conservation concern. The severity of the above impact is rated low considering that the area to be cleared (habitat to be altered) for the new road lanes is quite small (<20m) with generally little vegetation cover. The Impact would be site specific limited to only those areas to be cleared. The impact would be permanent. The probability of the impact is high since there will be definite habitat destruction for the roads to be dualled. The magnitude of the impact is therefore assessed as medium negative. The overall impact assessment is **small negative** for all roads to be dualled except Port bell road where it is assessed as **medium negative.** It is non-existent for roads that are not to be dualled since not much habitat alteration is expected. It is also non-existent for all junctions if trees are avoided.

Mitigation measures

- Cutting down of big trees and draining of wetlands which are main habitats for biodiversity will be minimised. Sentitive areas like woodlots and wetlands and major thickets will be avoided during construction.
- In cases where the sensitive habitats cannot be avoided, a plan to create these habitats will be put in place. For example if for unavoidable reasons, one tree is cut down, three more trees at the road side to replace the destroyed habitat will be planted. And if a wetland is to be drained, a section of it to service the remaining ecosystem will be left.
- Recovery of such areas (woodlots and wetlands) if affected during construction will be monitored.
- Any roosting or breeding sites encountered during construction will be avoided.

iii. Low fauna productivity rates

Low productivity rate is expected resulting from limited suitable breeding habitat and disturbances like noise and movement around potential nest sites. This impact applies to all roads

and junctions except Ndeeba Junction and Bank of Africa Luzira where no nest sites or suitable breeding habitat was seen.

The value of the birds has been assessed as medium for all roads and junctions where species of conservation concern (C-Species) where observed (Table 17 and 18). It is assessed as low for roads and junctions where no C-species were recorded. The severity of the above impact is rated medium considering that the area to be cleared (breeding habitats) for the new road lanes is quite small (<20m) with generally little vegetation cover. Also noise at the construction sites is not expected to be extreme. The Impact would be site specific since the project noise is not expected to go over 300 m from the construction sites. The impact would be short term lasting only for the construction period. The probability of the impact is high since there will be definite noise and movement and clearance of sites under new alignments for road to be dualled. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **Small negative** for all roads and junctions except Ndeeba and Bank of Africa where it is non-existent.

Mitigation measures

- Cutting down of big trees and draining of wetlands which are main habitats for biodiversity will be minimised. Sentitive areas like woodlots and wetlands and major thickets will be avoided during construction.
- In cases where the sensitive habitats cannot be avoided, a plan to create these habitats will be put in place. For example if for unavoidable reasons, one tree is cut down, three more trees at the road side to replace the destroyed habitat will be planted. And if a wetland is to be drained, a section of it to service the remaining ecosystem will be left.
- Recovery of such areas (woodlots and wetlands) if affected during construction will be monitored.
- Construction noise will be minimised.

d. Displacement of soil/earth material and cliff formation at borrow sources

Earth will be displaced during acquisition of materials from quarries and borrow pits for the construction of the new alignments for roads to be dualled. Earth will also be displaced during cut processes at the construction sites but this earth will most likely be replaced during fill processes. Acquisition of earth material from quarries and borrow pits will lead to creation of cliffs and may lead to unstable earth conditions which may be hazardous. This impact is applicable to all roads that are to be dualled or raised.

The value of the receptor (people) has been assessed high since people of all ages and of all vulnerabilities would be exposed to any hazard resulting from any project created unstable earth conditions. The severity of the above impact is rated low considering that the quarries and most

of the borrow sources to be used are already operational so the new area to be opened up is minimal. The impact would be site specific not going beyond 1 km radius from the centre of action. The impact would be short term lasting only for the construction period. The probability of the impact is high since there will be definite excavation for materials. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative** for all roads to be dualled or raised and non existent for other roads and junctions.

Mitigation measures

- Cuts on quarries will not exceed the angle of repose which could lead to rock falls, slips and land slides
- If not to continue in operation, all used quarries and borrow pits will be reinstated by backfilling with spoil material from the road cuts and then top soil initially removed from the quarry and borrow pit areas
- Exposed slopes will be protected using conventional civil engineering structures (such as stone filled meshed fences) in conjunction with bio-engineering techniques

e. Change in geological substructure

Excavation activities, cut and fill processes at quarry and borrow pit sites and at new alignments for roads to be dualled may change the arrangement and structure of the soils within the sites. Change in the arrangement and structure of the soils may in-turn cause unstable earth conditions and vibrations within the affected area. Vibrations of great magnitude could result into hazards such as ground failure which could in turn lead to destruction of property and loss of lives. This impact is applicable to all roads to be dualled or raised.

The value has been assessed high since people of all ages and of all vulnerabilities would be exposed to any hazard resulting from any project created unstable earth conditions. The severity of the above impact is rated low considering the areas to be excavated are not big. The Impact would be site specific not going beyond 1 km radius from the centre of action. The impact would be short term lasting only for the construction period. The probability of the impact is high since there will be definite excavation for materials and cut and fill processes. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative** for all roads to be dualled or raised and non existent for other roads and junctions.

Mitigation measures

- The above mentioned activities that would result into a change in the geological structure will be limited to only the areas under operation.
- Cuts will not exceed the angle of repose which could lead to rock falls, slips and land

slides

- Stock piles for each type of material excavated will be separated. This will be done to ensure systematic backfilling of created pits and to maintain a geologic arrangement close to the original.
- Exposed slopes will be protected using conventional civil engineering structures (such as stone filled meshed fences) in conjunction with bio-engineering techniques
- Newly eroded channels will be backfilled and restored to natural contours
- Areas susceptible to erosion will be protected using ether temporary or permanent drainage works
- Scouring of slopes will be prevented
- Ponding will be prevented
- If not to continue in use, all borrow pits and quarry sites will be backfilled to as near as possible their original topography
- Grouting will be undertaken since it can improve the stablility of unstable slopes

f. Soil pollution

Improper disposal of discarded oils and lubricants, and spoil materials from cuts could result into pollution of soil. Soil may also be polluted by bitumen spills especially during asphalt plant operations, surfacing of roads and transportation of bitumen. Accidental oil/fuel spillages during refueling of project vehicles and generators, maintenance and servicing of vehicles and generators at workshops, refilling of fuel tankers, and vehicular accidents may also pollute the soil. Soil could also be polluted as a result of improper disposal of waste. Pollution of the soil may make it unproductive especially for agricultural products, could affect soil organisms. This impact is applicable to all roads.

The value of the receptor (soil) has been assessed **low** considering that the cropping activity it supports is minimal and on a small scale. The biggest cropping area observed by the roads was about 80x 80 m on Tuba road. The severity of the above impact is rated low considering the small scale of agriculture observed. The Impact would be site specific not going beyond 1 km radius from the centre of action. The impact would be short term lasting only for the construction period. The probability of the impact is medium. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative** for all roads with gardens and non-existent for other roads and junctions.

Mitigation measures

- All waste lubricants and oils will be collected and recycled or disposed of offsite to approved sites of disposal.

- Central locations for refueling of vehicles and fuel powered machinery will provided
- The floors of refueling points will be impervious on a level ground and bunded/lined constructed of concrete, asphalt, chemically compatible polymer material or any other impervious surface that will contain gas, oil or any other fluids in use.
- Hazardous material including bitumen will be stored in bunded area with a solid impermeable floor (to aid any clean should leaks or spills occur).
- Contaminated runoff from oil storage areas will be drained/led into ditches and ponds with oil traps (interceptors).
- Spilling of surfacing materials such as bitumen will be avoided. During transportation, bitumen will be well packed to avoid any spillages
- Bitumen will not be applied on the road surfaces during strong winds, or heavy rains
- Side drains will be lined
- Unused bitumen will be collected for future use
- Biological dispersants or landfill techniques will be used to break down used oils
- Contractors will use bitumen emulsion where feasible. In hilly areas with steep road gradient, cut-back bitumen will be used
- Bitumen will not be discharged into side drains
- Bitumen drums will be stored in designated locations and not scattered along the road.
- The use of chemicals, herbicides etc. to clear vegetation will be forbidden due to the heavy pollution they cause to the soils
- Regular servicing and maintenance of vehicles and construction machinery that are likely to spill fuel and oils if ill-serviced will be undertaken
- Permits/approvals for fuel storage and transportation will be acquired from the responsible authorities
- An oil spill prevention and counter measure Plan will be developed and followed. Below are some of the requirements that will be included in the spill prevention and counter measure Plan

i. Institute stringent fuel storage and refueling procedures such as not refueling or transferring fuel after dark or under deficient light conditions.
ii. Restriction of fuel transportation to day time as it is easier to deal with accidents during day time.
iii. Concrete casing of fuel storage tanks.
iv. Use of only fuel storage tanks of a double casing
v. Concrete bunding of fuel storage areas
vi. Installation of oil interceptors at fuel storage areas
vii. Use of drip pans (wherever necessary) during fuel transfer into onsite tanks.

viii. Stock adequate supplies of oil/fuel spill control kits and train some staff in spill prevention and control.

ix. Contract a NEMA licensed waste contractor to collect and dispose of oily waste. Alternatively, if agreeable, return waste oil to suppliers for either reprocessing or reuse.

x. Observe and enforce strict enforcement of speed limits when transporting hydrocarbons or waste oil.

- A proper waste management Plan will be developed and followed.

Bulleted below are some of the statements that will be included into the Waste Management Plan.

i. Wastes must be appropriately segregated into categories such as; inert, domestic, non-hazardous or potentially hazardous, metal, plastics, biodegradable, non-biodegradable etc.).

ii. Dust bins will be placed at different locations and properly labelled.

iii. Waste minimization will be emphasized and implemented throughout stages of project construction and operations.

iv. Waste storage areas will be hygienic to prevent nuisance odours, vermin and dust, loss of waste materials and scavenging.

v. Waste will be removed from the site in manner consistent with national regulations (for example, transporters will be licensed). While transporting waste, care will be taken to prevent waste spreading to areas outside the site boundary.

vi. At any workers camps to be established, organic waste will be buried on site while measures will be instituted to have any recyclable waste stockpiled to await transportation to recyclers.

vii. Soak away pits and septic tanks for domestic waste will be constructed at workers' camps.

viii. Sanitation facilities will be provided at the workers' camps.

g. Alteration of Drainage Patterns

Road construction can modify the natural flow of surface water by concentrating flows at certain points and in many cases increasing or decreasing speed of flow. Alteration of drainage patterns may increase the rate of runoff in a way that results in flooding. It could create or alter hydrological characteristics of the area producing runoff that would exceed the capacity of existing storm water drainage systems or cause reduced flow which may result in stagnation in some drains. The effects of this impact may even be felt beyond the immediate vicinity of the road.

There may be substantial temporary works associated with diversion of channel flow during road construction. This impact is applicable to all the project roads because storm water from most of the roads ends up in drainage channels to the outfalls. The construction activities may constrict the carrying capacity of the channels. The magnitude of the impact on hydrology is expected to be **Medium Negative** because the impact is local and for a short duration during construction. The overall significance of impact is expected to be **Medium Negative**.

Mitigation measures

- Plans for channel flow diversions during construction need to be submitted & approved by KCCA.
- Provision of adequate drainage during construction
- Existing drainage channels should be renovated or expanded to be able to convey the surface runoff.
- Ensure that the existing drainage channels are connected to the natural outfalls
- De-silt and remove solid waste from the drainage channels to avoid blockage. Also provide screens at culverts.
- Where drainage channels do not occur, a shallow interceptor ditch or barrier will be needed to intercept overland flows and discharge to the outfalls.

h. Soil erosion and sedimentation (Siltation)

Road construction activities like clearance of vegetation, excavation, compacting, installation/repair of culverts, cut and fill, will loosen soils that may be eroded by storm water into water sources observed by some of the project roads. Soil from stock piles of top soil and spoil material at quarry sites or borrow pit areas and construction sites may be eroded into water sources by the roads and any water sources that may be within the vicinity of the quarry sites or borrow pit areas to be used. Soils from constructed access roads to quarry sites, borrow pit areas, workshops, workers camps may be eroded by storm water into the water sources that may be within close proximity to the access roads. Siltation of water sources would reduce the present quality of the water and make it unsuitable for drinking or inhabitable for biota. Sedimentation of wetlands/streams may cause water in the wetlands/streams to change its course or become stagnant. The change in water flow direction and flow velocities may result into death of water dependent biodiversity that may be deprived of water as a result of change into water flow direction and reduced velocities. This impact is applicable to all roads with water sources by their side. The roads include Mugema, Old Mubende, Sentema, Muzito, Ssuna road 2, A109, Portbell road, Wamala, Tuba, Kulambiro/Najeera, Ntinda/Nakawa, Kirombe and Spring road.

The value of the sampled water sources at Port bell road, spring road, Ntinda/Nakawa, Kulambiro/Najeera, Kirombe, Mugema, Old Mubende, Tuba, A109, Suna, Muzito and Sentema roads is low since they have high total suspended solid content. The value of the protected spring

on Wamala road is Medium because the measured parameters were within the limit of the national standard for drinking water. The magnitude of the impact is expected be medium negative since the impact is temporary, expected only during construction and localized with a high probability of occurrence. The overall impact significance is anticipated to be **medium negative**.

Mitigation measures

- Minimisation of earth works such as excavation, cut and fill, vegetation clearance, and compaction, to only the area that is absolutely necessary
- Construction cutoff ditches around stockpiles to prevent materials being washed away by surface runoff
- Excavated and stockpiled materials will be covered with fabric or other materials
- Stock piling near waterways or on slopes will be avoided
- Use of existing roads as access roads to quarry sites, borrow areas, workers camps, and workshops where possible
- Revegetation of any constructed access roads during the decommissioning phase of the project.
- Location of stone crushing plants away from water courses
- Stone crushing plants will be fitted with approved dust controls and operated in accordance with manufacturer's specifications
- Soil erosion checks will be put in place where ever necessary along drains. These checks will include scour checks, silt traps, paving of drains, and stone pitching. In addition, drains will be regularly desilted.
- Construction of interception ditches, and settling ponds to prevent muddy water reaching water sources
- Water supply sources will be identified and relocated before site clearing and construction.
- Excavation and grading activities will be planned during the dry season where possible
- After construction, vegetation will be planted in areas where vegetation was removed including areas where soil spoil was previously dumped.
- Channelisation will be done in such a way that water continues to flow in a direction as near as possible to its original.
- Rock boulders will be placed as the first layer at the bed of swamps when filling swamps to allow continued water flow.
- Undertaking works in sloppy areas (catchment areas) will be avoided. However if they must be undertaken there then drainage systems (outfall drains) will be installed

to make sure water from the catchment areas maintains its original flow direction/to make sure that water from catchment areas ends up in its usual basins.

- Where banks of streams going through the wetlands are erodible, gabions and other measures to minimize erosion will be put in place
- Culverts and drainage channels will be constructed/installed taking the peak water levels of streams and swamps into consideration.
- Culverts will be leveled appropriately so that they are self-cleaning.
- De-silting of road drainage systems will be undertaken regularly.
- In addition, individual Environmental Impact Assessments (EIAs) for excavation of material from borrow pits, quarry sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants will be conducted before the excavation of material from borrow pits, quarry sites and before the construction of workshops, workers' camps, equipment storage sites etc. The EIAs will however be spearheaded by qualified and registered EIA practitioners.

i. Water pollution due to oil spills/inadequate sanitary facilities and waste material besides spoil

Road construction activities involve use of lubricants/oils including bitumen, asphalt for road surfacing, and oils and fuels for running haulage tracks and some construction machinery. If there are any leakages, these oils, fuels and lubricants would end up in the water of swamps and streams by some roads and hence pollute the water. Wastes from storage sites and accommodation camps, workshops, and at construction sites has the potential to contaminate water. Water quality may also be compromised incase the contractor fails to provide adequate sanitary facilities for the workers forcing them to use the surrounding for easement purposes.

This impact is applicable to all roads with water sources by their side or within the immediate environment of the roads. The roads include Mugema, Old Mubende, Sentema, Muzito, Ssuna road 2, A109, Port bell road, Wamala, Tuba, Kulambiro/Najeera, Ntinda/Nakawa, Kirombe and Spring road. The value of the water in the sampled water sources has been assessed low considering that the fair quality of water in the identified water sources with very high bacteria load and total suspended solids. The severity of the above impact is rated low considering that minimal waste if any is expected to end up in the water sources. The amount of waste is not expected to substantially affect natural processes or the communities dependent on the water sources. The Impact would be site specific not going beyond 1 km radius from the centre of action. The impact would be short term not extending beyond 5 years. Most of the water samples are from springs which are protected and a bit of a distance from the road and the water channels

usually do not contain much water especially in the dry season. Water contamination from oil spills and other waste besides spoil material may arise from negligence, accident or deliberate sabotage. The probability of the impact is therefore low. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative** for all roads with water sources by their side and non-existent for other roads and junctions.

Mitigation measures

- All waste lubricants and oils will be collected and recycled or disposed of offsite to approved sites of disposal.
- Floors of workshops, bitumen and asphalt storage plants and refueling points for all haulage vehicles and construction machinery will be bunded (lined with concrete) to avoid percolation of spilled oils and fuels into ground water or runoff of spilled oils and fuels into surrounding surface water.
- The contractor will provide sufficient sanitary facilities for the work force
- Hazardous material including bitumen will be stored in bunded area with a solid impermeable floor (to aid any clean should leaks or spills occur).
- Contaminated runoff from fuel and bitumen storage areas will be drained/led into ditches and ponds with oil traps (interceptors).
- During transportation, bitumen will be well packed to avoid any spillages
- Bitumen will not be applied on the roads during strong winds, or heavy rains
- Unused bitumen will be collected for future use
- Use of biological dispersants or landfill techniques to break down used oil
- Contractors will use bitumen emulsion where feasible. In hilly areas with steep road gradient, cut-back bitumen will be used.
- Bitumen will not be discharged into side drains
- Bitumen drums will be stored in designated locations and not scattered along the road.
- Regular servicing of vehicles and generators and other fuel utilizing machinery will prevent fuel leakages
- Use of chemicals, and herbicides for clearance of vegetation will be avoided. Mechanical or/and manual methods will be employed for vegetation clearance.
- An oil spill prevention and counter measure Plan will be developed and followed. Statements to form part of the oil spill prevention and counter measure Plan have been provided under Section 7.2.2.2f of this report
- Facilities for collection and the safe disposal of litter will be provided at all work force sites
- All road construction crews will be under strict instruction to dispose of both solid and liquid wastes into only the designated facilities.

- Routine inspections aimed at assessing the effectiveness of waste management systems will be undertaken by the contractors' site engineer and the resident engineer, reporting to the environmental unit in KCCA
- Development and implementation of a waste management plan
  Statements to form part of the Waste Management Plan have been provided Section 7.2.2.2f of this report.
- In general, all issues related to waste disposal will be implemented following the regulations stipulated in the National Environment (Waste Management) Regulations 1999
- Fuelling points and bitumen and asphalt storage sites will not be located near surface water.
- In case, community water sources are polluted, alternative community wells/springs will be constructed and maintained throughout the construction phase. Water quality from such well/springs will also be constantly monitoring by the contractor and independent consultants to ascertain quality.
- Maintenance and repair of vehicles and equipment will not be done in the wetland or near water sources
- An oil interceptor will be put in place at the work shop area so as to contain any oil spills.
- All spills of contaminants will be reported to Directorate of Water Resources Management as soon as the spill is noticed.
- The water sources if not earlier relocated that will be damaged as a result of the project activities will be rehabilitated.

j. Air pollution

Although better traffic flow due to improvement of roads and junctions will result in reduced net volume of carbon emissions into the atmosphere that would otherwise lead to global warming, the project will in several ways that are explained below, depreciate the quality of air. The project is likely to impact air quality from gaseous emissions by moving vehicles and machinery releasing gases e.g. carbon monoxide , Sulphur oxides, Nitrogen Oxides, and from bitumen fumes. Dust emissions may temporarily hamper visibility, cause damage to crops in home gardens by the roads affecting their growth and quality, stain road side sold goods, stain houses and household property along the roads, worsen surface water quality, cause respiratory (e.g. silicosis, sinuses and asthmatic attacks) and eye infections (particularly for workers). With regard to gaseous emissions, it will be difficult to determine the source of the emissions, considering that the roads to be improved are already very busy with high traffic. With regard to dust (particulate matter), and bitumen fumes, it will be obvious during the construction works.

The project is expected to release emissions into the air from dust emissions generated from stone crushing plants, asphalt plants, excavation works on construction sites and quarries and borrow pits, heaping and tipping of murram and gravel at quarry sites and borrow pits, filling and compaction processes, dumping of materials onto stockpiles, and construction material haulage vehicular movements on unpaved roads. Emissions are also expected from gaseous emissions by moving vehicles and machinery releasing gases e.g. carbon monoxide (CO), Sulphur oxides, Nitrogen Oxides, and from bitumen fumes. Generally, the air quality of the project areas will deteriorate due to dispersion of air pollutants expected from the project. If appropriate mitigation measures are not put in place to control air pollution human health and environment will be greatly affected for example; Particulate matter of 10 and 2.5 micrometers can affect the respiratory system and can be inhaled. Pollution from particles especially fine particles contain microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Particle pollution exposure is linked to a variety of problems, including:

- premature death in people with heart or lung disease,
- nonfatal heart attacks,
- irregular heartbeat,
- aggravated asthma,
- decreased lung function, and
- Increased respiratory symptoms, such as irritation of the airways, coughing or difficulty in breathing.

Generally the concentration of Particles of 2.5μm diameter for most of the sampled points along the roads and junctions, were below the air quality standard for World Health Organization which is 25μg/m^3 and the concentration of Particles of 10μm diameter were above the air quality standard for World Health Organization which is 50μg/m^3 thus air quality will definitely deteriorate during construction phase. The value of the receptors is high. The severity of the impact is low. The extent of the impact is local. The duration of the impact is short-term. The probability of the impact is medium. The magnitude of the impact is anticipated to be medium negative. The overall impact assessment is anticipated to be **medium negative.**

Mitigation measures

- To minimize dust emissions caused by movement of vehicles, unpaved roads will be sprinkled with water (using water browsers); For Roads to be upgraded, the amout of water/ number of times should be more than for roads to be dualled and expanded. The recommended number is 3 to 4 times depending on the level of dust.
- Personal protective equipment such as dust masks will be availed to workers whenever

needed;

- Regular servicing of vehicles and machinery that are likely to produce excessive gaseous emissions will be undertaken
- The speed of haulage trucks and other vehicles will be limited to 30km/hr. to reduce dust emission. To ensure this, speed humps will be put in place, sensitization of drivers about speed limits undertaken and penalties for drivers that do not heed to the speed limits enforced.
- All idle equipment or machinery will be turned off to minimize on gaseous emission.

k. Depreciation in visual scenery

After the construction phase of the project, the visual scenery of the project roads and junctions will improve. However during the construction phase, activities such as vegetation clearance, digging of gravel and murram pits for acquisition of murram and rock fill, demolition of buildings within the RoW for roads to be dualled will depreciate the natural scenery and visual impression of the sites where those activities will take place. A number of wastes including construction debris, comprising of stone, metal, pipes, spoil material from cut and fill, wood and grass waste, waste from demolition of buildings e.g. rubble, metals and other structures within the RoW, packaging materials, oil and fuel drums, and empty bitumen drums, among others, will be associated with the project. Heaping up, scattering and generally improper disposal of this waste could depreciate the scenery and natural beauty of the area. Gullies created as a result of erosion will also depreciate the visual impression of the areas where the gullies will be created. The impact is applicable to all roads and junctions.

The value of the roads present scenery and material extraction sites has been assessed as **low.** The severity of the above impact is rated low considering that the area to be cleared for the new road lanes for roads to be dualled where impact would be more significant is quite small (<10m). In addition most of the material extraction sites are already being used for the purpose (already in operation). The impact would be site specific limited to only those areas directly affected. The impact would be short term lasting only through the construction period. The probability of the impact is high since there will be definite clearance for new right of ways, material extraction and wastes are to be generated. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative.**

Mitigation measures

- Clearing of vegetation and demolition of buildings will be limited to only those areas where it is absolutely necessary.
- On completion of construction works, any areas that were cleared of vegetation but are not

paved will be planted with grass and trees indigenous to those areas.

- Where the Contractor prefers to open borrow pits and quarries purposely for this proposed project, quarries and borrow pits will be restored or rehabilitated to as far as is possible their original conditions. The requirements for reinstatement will be included in the contract documents. The general habitation procedure will be as follows:
  - Back fill the gaping holes with spoil material from cut and fill process along the road followed by stockpiled overburden (material that is found between top soil and the wanted gravel or murram during excavation) initially removed from the quarry and borrow pit sites
  - Levelling/recontouring and compaction of the fill in the pit
  - Spreading of stock piled top soil initially obtained from the borrow and quarry sites over the compacted fill material. The top soil layer will not be less than 50cm thick.
  - To prevent wash away of fill material and top soil, revegetate the top soil with grasses and/or trees indigenous to the site. In case of sites with sloppy terrains revegetation will be done during dry season and not during the wet season because top soil could easily be washed by storm water and hinder the growth of the grass. The grass planted during the dry season will be watered until it grows.
  - Where quarry and borrow pits are not backfilled for future excavation, then the sides of these pits must be smoothened and the quarry/pit perimeter fenced. Where quarries are not backfilled to a level where all the cliff lengths are covered, then exposed cliffs will be supported by stone meshed fences.
- Where the Contractor prefers to procure construction materials then the duty for restoration of the sources will be resident with the private commercial operators. Meanwhile, materials will be procured from the sources that meet statutory requirements.
- Individual Environmental Impact Assessments will be conducted before the excavation of material from any new borrow pits, and quarry sites. These Environmental Impact Assessments will be carried out by qualified and registered environmental practitioners.
- A waste management plan will be developed and implemented. The waste management plan will include the waste management statements presented in Sub Section 7.2.2.2f of this report, as well as the following;
  - The woody waste will be disposed of to the rural settlers for use as fuel wood or for making charcoal.
  - Metallic waste from demolished structures will be disposed of as scrap.
  - Rubble from the demolition works will be examined and where they are found to be suitable, the same will be used as fill material in low lying flood prone areas within the RoW.
  - Empty bitumen drums will not be scattered along the construction site. A central place for storage of empty bitumen drums awaiting disposal to appropriate sites will be got.

- During site reinstatement, top soil removed from the project sites during site clearance will be returned and planted with grass and trees indigenous to the sites.

7.3 Post-construction phase

7.3.1 Socio-economic impacts

7.3.1.1 Positive impacts

a. Improved mobility of vehicles, reduction in travel time and reduced traffic congestion

This impact will be felt on all the proposed roads and junctions. The sensitive receptors are the users of the road and the people living or working along the roads. The current poor condition of the roads and junctions makes movements for vehicles slow due to potholes, narrowness and being muddy and slippery during the rainy season. This is most felt during the rush hours. In addition, some of the roads e.g. Kabuusu-Kitebi-Bunamwaya road near Sembule flood during the rainy season making them impassable. All this contributes to the slow movement of vehicles, congestion and emission of unwanted fumes. It is expected that after construction of the roads and the junctions and with the installation of traffic lights and a well managed traffic centre, the currently heavy traffic will be properly managed and reduced and there will be improved mobility of vehicles from one point to another and the time used will also be reduced. The value of the aspect is high. The duration of the impact is long term, its severity high, the extent will be regional as it will benefit many road users from different areas moving from one destination to another and the probability of its occurrence is also high. The magnitude of the impact is assessed as Large positive. The overall impact assessment is hence **very large positive**

Enhancement measures

- Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.
- Installation of road signage to control against accidents related to the "new road effect"

b. Reduced vehicle wear and tear thus reduced maintenance costs

This impact will mainly be felt on roads that are scheduled for upgrading. The current state of the roads especially unpaved roads leads to faster wear and tear of vehicles and therefore high vehicle maintenance costs for persons especially living along these roads who use them on a daily basis. With the upgrading of the roads, vehicles will not easily wear and tear and the people may be able to save some money meant for maintenance of the vehicles thus the severity is considered as medium. The value of the impact to the receptor is high. This impact is long term and local-

national in extent as mainly people living along the roads and vehicles operating along these roads (e.g. taxis, trucks) will benefit. The probability of the impact occurring is high. The magnitude of the impact is thus assessed as medium positive. The overall impact assessment is hence **medium positive.**

Enhancement measures

- Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.
- Regular post construction road maintenance to avoid the breakdown of the new road infrastructure and return to the initial poor road conditions

c. Reduction in dust levels

This impact will largely be felt on the roads that are currently unpaved e.g. Kabuusu-Kitebi-Bunamwaya, Kirombe road, Sunna I, Wamala road, Muteesa I road, Kigala road etc. The sensitive receptors are the people living and operating along the currently unpaved roads. Currently, the people along these roads experience a lot of dust especially during the dry season (Section 3.2.1.5). This dust was visibly noted on buildings and crops on some roads. In addition, vehicles constantly using these roads become dirty quickly, thus increasing the frequency of washing and therefore associated costs. Furthermore, consultations revealed that the dust is also a nuisance inside the houses/buildings where all household belongings become dusty. With the upgrading of the unpaved roads and proper construction of the pavements on the proposed roads, there will be a reduction in dust levels for users of these roads and people residing or working along the roads. The value of the aspect of reduction in dust levels is high. The impact will be long term, its severity high, the extent will be national and the probability of its occurrence high. The magnitude of the impact is large. The overall impact assessment is hence **very large positive.**

Enhancement measures

- Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.
- All bare surfaces opened during the construction phase will be rehabilitated by way of revegetation
- Routine (preferably daily) sweeping of the roads and their sides to reduce on any dust that may accumulate as a result of day to activities of people operating along the different roads.
- Enforce speed limits

d. Improved access to health services

This impact applies to all the proposed roads and junctions. The value improved facilities on the people is high. There will be an improvement in the access to health services especially in times of emergencies. Health emergencies occur at any time. With good roads, improved mobility (less traffic jam), households will reach health facilities in a shorter period compared to now thus saving people's lives. This impact is long term, the probability of it occurring is high and will benefit many people and the country at large thus the magnitude of the impact is assessed as Large positive. The overall impact assessment is hence **very large positive.**

Enhancement measures

- Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.
- Availability of drugs in health facilities
- Adequate medical personnel to help save the lives of people.

e. Increase in value of land and property along the roads

The price of land and property including rental houses along these roads will rise from the current one after road improvement. This will provide monetary benefits to the owners of the property. The value attached to increased value of property is high. This impact is long term, but will only benefit the property owners and non-property owners will pay heavily. The severity of the impact is considered medium and the probability of occurring is also medium. The magnitude of the impact is thus considered medium positive and the overall impact assessment is hence **medium positive.**

Enhancement measures

- Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.
- Availability of drugs in health facilities
- Adequate medical personnel to help save the lives of people.

f. Land development and more business opportunities

The construction of the roads will lead to an increase in structural development. This impact will mainly apply on roads that still have sections that are unbuilt e.g. along Kabuusu-Kitebi-Bunamwaya towards Lweza where structures are more scattered, along sections of Kisaasi road 2

and Tuba road etc (Appendix XV; Section 1.3). Among the developments will be commercial structures thereby opening up more economic opportunities for the people. The value attached to the aspect is high. The impact will be long term, the probability of its occurrence is high but it will be local as it will mainly benefit people along the respective roads. The magnitude of the impact is thus expected to be medium positive. The overall impact assessment is hence **medium positive.**

Enhancement measures

- None

g. Improved sanitation and a reduction in related diseases

This impact will be felt on roads with currently poor drainage channels and poor sanitation like Ssuna I road, Namungoona road, A109, Mugema road, Kirombe road and Kyebando road among others. Poor drainage and sanitation are normally associated with diseases like diarrhea, malaria and cholera. With the proposed interventions on the different roads, proper drainage channels are expected to be constructed reducing water stagnation along the roadsides and flooding during heavy storms thus reducing the incidence of diseases. It is also expected that with proper drainage, people will not just dump the garbage in the drainages thus improving sanitation. The value of the aspect is high. The impact will be long term and will improve living conditions of people along such roads. The severity of the impact is thus expected to be medium. However, it will require time to change and improve the sanitation practices of the people. The probability of its occurrence is estimated to be low to medium. The magnitude of the impact will thus be medium positive and overall impact assessment will hence be **medium positive.**

Enhancement measures

- KCCA will provide dumping bins in designated places for people to dump in their rubbish. These bins will be emptied on a regular basis.
- Private garbage collectors will be contracted to collect rubbish along the roads on a regular basis.
- Sensitisation campaigns towards change in sanitation practices and proper sanitation could be engineered by KCCA in Kampala in general and along the roads.
- Bylaws against littering of rubbish will be developed and disseminated to the people. Fines will be paid by whoever breaks them.

h. Street lighting

Currently, most of the roads especially the unpaved ones have no street lighting. For those with some street lights, the lights were either stolen or are non-functional. The lack of street lighting

on Kampala roads contributes to the high rate of crime in the city and its suburbs. Street lighting is part of the proposed improvements for the roads. The value of the aspect of street lighting to the people is high. It is expected that with street lighting, the rate of crime will reduce and the general outlook and beauty of the respective roads will also improve thus the severity of the impact will be high. The duration of the impact is considered long term if measures are put in place to safeguard these lights. The probability of the impact is high. The impact will also benefit many people using the different roads. The magnitude of the impact is thus considered large positive. The overall impact assessment is hence **very large positive.**

Enhancement measures

- Continuous community awareness on community policing to safeguard the street lights.
- The lights will be designed in a way that they will be difficult to be stolen/vandalised

i. Improved Scenic Beauty/Aesthetics

This impact will mainly be felt on the unpaved roads and the roads with currently unconstructed pavements or even where the currently paved roads will be improved to dual carriage way. The value associated with improved scenic beauty is high. The beauty of the roads will improve after construction. Paved roads with good landscaping, street lighting and good drainage will improve the beauty of the area. In addition, there will be a reduction in the levels of dust generated after construction leading to cleaner buildings. Currently, most of the buildings along the unpaved roads or roads with poor pavements are covered in dust thus creating an ugly sight for the onlookers. The value of the aspect of improved aesthetics is high. The severity of the impact is expected to be medium. The extent of the impact will be regional. The impact will be long term but will require constant efforts from KCCA and behavioural change from the people to maintain the beauty. The probability of the impact is high. The magnitude of the impact is thus qualified as **medium positive.** The overall impact assessment is hence **medium positive.**

Enhancement measures

- Daily sweeping of the roads is required
- Routine and timely garbage collection by KCCA
- Enforce fines to whoever will be found littering garbage anyhow.
- Periodic and regulated desilting of drainage channels
- Periodic maintenance of the roads and street and junction lights

j. Tourism attraction

The baseline information along all project roads and junctions shows that no direct destructive impacts of the project on physical cultural resources is foreseen (Table 27). It should be noted

that, the most notably physical cultural resources in the project area are basically historical monuments/built heritages to include historical buildings, forts, temples, churches, mosques, tombs and shrines including Kasubi Royal Tombs, Lubiri Kabaka's Palace, Lukiiko (Parliament of Baganda), Uganda Marty's shrine Namugongo, the Munyonyo Catholic church, Rubaga Cathedral, Namirembe Anglican Cathedral, Kibuli Mosque, Gaddafi National Mosque, the Baha'i Temple, the Independence Monument, and Fort of Captain Lugard which have cultural significance at local, national and international level (Section 3.2.3.18). These tangible heritages resources are found within the project area but not immediate to direct impact zone. These will impact positively on the project. It is expected/ post construction phase will encourage more people to visit these places of cultural interests for education (history research) and tourism activities due to the improved road network. The value of the aspect of tourism attraction is assessed as high. The severity of the impact is considered as medium. The extent of the impact is regional. The duration of the impact is expected to be long term while the probability of its occurrence is considered medium. The magnitude is medium positive. The overall impact assessment is assessed as **medium positive.** It is applicable to all roads and junctions.

Enhancement measures

- Increase/ promote archaeo- tourism related activities
- Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.

7.3.1.2 Negative impacts

a. Loss of jobs

There will be loss of jobs for the project workers after completion of construction. Loss of jobs and income can lead to psychological torture to affected individuals and their families. The affected will have to look for other employment opportunities in order to survive. The experience and skills gained on the project are expected to make it easier for them to get other similar jobs. However, the fact that jobs are not very easy to come by in the country may translate the duration of the impact to long term for some workers. The impact will affect all project workers (skilled, semi-skilled and casual labourers) but the impact will be felt mainly by the unskilled and semi-skilled. The value of the aspect is high. The severity of the impact is low. The impact will be site specific. The impact is expected to be temporary-medium term until the affected workers can get other opportunities. The probability of its occurrence is also expected to be high. The magnitude of the impact is thus assessed as medium negative and the overall impact assessment as **medium negative.**

Mitigation measures

- Counselling programs for the workers before completion of the construction.
- Financial literacy and management trainings may be carried out for the workers to ensure proper and prudent use and investment of their salaries to ensure continued earning even after completion of construction.

b. Blocking of access to homes and other public places

As a result of the drainage structures on the roads, it is very common to block off access to homes and business premises permanently. It has been observed on most of the roads within the country, that most homes that are close to the road are not accessible by car, because of the drainage systems installed along the road. In other instances, where the construction process requires "cut and fill" methodology, structures on the cut side may be left hanging up with no motorable access to these homes or business premise irrespective of whether they were accessible prior to the project. This impact is long term and could cause permanent inconvenience to the affected parties. The severity of the impact is medium. The extent will however be local because not all people along the different roads will be affected. The probability of the impact is high. The magnitude of the impact is assessed as medium positive hence the overall impact assessment will be **medium negative.**

Mitigation measures

- Ensure that after construction, there are alternative accesses to the blocked homes
- Round culverts will be adopted for drainage in the sections where there is a home or business premise in close proximity to the road.

c. Increase in traffic on some roads

This impact will be felt on a few roads like Kabuusu-Kitebi-Bunamwaya and Ssuna II and the sensitive receptors will be the users of the road. Due to the improvement in the roads, some roads like Kabuusu-Kitebi-Bunamwaya and Ssuna II will experience higher traffic compared to other roads. This is because the road will now be used for access by many users from Entebbe since it is a short cut off Entebbe road to Kampala and to Masaka road. The value of the aspect is assessed as high. The impact will be long term and the probability of occurrence is high and the extent will be local since only a few roads will be affected. The magnitude of the impact is thus estimated as medium negative. The overall impact assessment is **medium negative.**

Mitigation measures

- Proper signalization of the proposed junctions like Kabuusu junction and effective use of the traffic lights will help to reduce the anticipated traffic along the affected roads.

d. Community health and safety

This impact is likely to occur mainly on newly upgraded roads and the sensitive receptors are the users of the roads. Drivers on a newly improved road commonly excitedly drive faster than is often safe: a risky behaviour common on a new road in Uganda which we can refer to as "new road effect". This usually happens in the first few months of commissioning a new road often leading to injuries or loss of life or damage to vehicles. In urban areas, boda bodas and taxis are known to drive recklessly especially on new roads. The value of the aspect of community health and safety is high.The impact would be short-term but the resultant effect long-term. The probability of impact occurrence is medium but severity high where accidents lead to loss of life. The extent of the impact will be regional. The magnitude of the impact is assessed as medium negative and the overall magnitude of the impact is assessed as **medium negative.**

Mitigation measures

- Proposed speed limits per road will be maintained.
- Wherever feasible, humps will be installed to regulate speed.
- Road safety campaigns especially among pupils/students will be undertaken by the schools' administrations. Introduction of road safety education curriculum in schools especially primary and secondary levels.
- Where feasible especially near schools, zebra crossings will be provided for.
- Road safety campaigns in general for road users through radio talk shows.
- Placement of traffic officers along areas that may considered most at risk e.g. at junctions.
- Constant performance monitoring of the roads to identify any black spots that could lead to accidents.

7.3.2 Biophysical impacts

7.3.2.1 Positive impacts

The project is not expected to have any significant positive biophysical impacts during the post-construction phase.

7.3.2.2 Negative impacts

The project is not expected to have any significant negative biophysical impacts during the post-construction phase.

7.4 Cumulative impacts

These are impacts that are individually limited but cumulatively considerable or for which the incremental effects of an individual project are considerable when viewed in connection with past projects, current projects and probable future projects. A number of projects were noted taking place within proximity to some of the roads/junctions to be improved including, upgrading of the Northern bypass, proposed commercial development on plot 54 upper Kololo terrace, upgrading of Lugoba road at Kawempe junction, construction of Bahai road near Kisasi road 2, construction of apartments by Kulambiro ring road, improvement of Gabbunga road near Wamala road, among others. A number of UNRA and KCCA road projects are planned or currently on-going in and around Kampala as such KIIDP 2 Batch 1 roads. The magnitude of some of the project independent impacts discussed above may increase as a result of current or future projects. The impacts are discussed below;

i. Increased exposure to noise

The noise currently produced by construction activities of the ongoing projects with Kampala would increase in intensity with implementation of the proposed project and other planned projects. The value of the people that are exposed to the noise is assessed high. The severity of the above impact is rated medium because on every road there are people working or residing in proximity of the project sites. The impact would be site specific limited to only those areas directly affected. The impact would be short term lasting only through the construction period for the proposed project. The probability of the impact is high since there will be definite increase in noise levels. The magnitude of the impact is therefore assessed as minimal. The overall impact assessment is **small negative.**

ii. Increased disruption of traffic

Traffic will be disrupted on all the roads and junctions under construction. The impact will mainly be felt during peak hours. Given the urban nature of the roads, there is not enough space to create alternative routes for continuous traffic flow. This will cause delays for road users rushing to work and going to other destinations. In addition, pedestrians' moving along the roads will also be largely inconvenienced. The impact will be intensified by disruption of traffic by current and planned projects within the city. The value of the road users to be affected is assessed as high and the overall impact assessment as medium negative. The value of the road users to be affected is assessed as high. The severity of the above impact is rated medium because of the large number of roads within the project scope. The impact would be national. The impact would be short term lasting only through the construction period for the proposed project. The probability of the impact is high since there is not enough space to create alternative routes for

continuous traffic flow. The magnitude of the impact is therefore assessed as large negative. The overall impact assessment is **very large negative.**

iii. Increased loss of plant species and degradation of habitats

The impact of loss of plant species and degradation of habitats discussed under Section 7.2.2.2a will be intensified by the loss of plant species and degradation of habitats by other projects e.g. KIIDP 2 Batch I roads and upgrading of the Northen Bypass among others.

The value of the plants and habitats has been assessed as medium since some plants by the roads are of conservation concern and some habitats such as wetlands by the roads are ecologically sensitive. The severity of the above impact is rated medium considering that not much vegetation is expected to be cleared by the projects. Natural functions and processes supported by the cut down plant species would be moderately affected. The impact would be local. The impact would be permanent. The probability of the impact is high since there will be/there has been definite clearance of vegetation for the projects. The magnitude of the impact is therefore assessed as medium. The overall impact assessment is medium negative.

iv. Increased Air pollution

The impact of air pollution discussed under Section 7.2.2.2i will be intensified by air pollution from ever increasing traffic in the city, other construction projects and evaporative losses at fuel transfer points. The value of the receptors of the impact is high. The severity of the impact would be low. The extent would be local. Air pollution will be experienced only during construction phase thus the duration is short-term. The magnitude of the impact is anticipated to be medium negative and the overall impact is anticipated to be **medium negative.**

Mitigation measures for cumulative impacts
The mitigation measures for the independent project impacts presented in section 7.1-7.3 will be implemented.

7.5 Residual Impacts

With implementation of mitigation measures, the significance level of the negative impacts will be reduced to either minimal/no or small negative except the impacts of loss of land and structures whose significance levels will be reduced to medium negative. This is represented in Table 57 below.

Table 57: Summary of impact assessment

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
Pre-construction Phase					
Socio-economic impacts					
Positive impacts					
Employment opportunities	-♦-	-♦-	Small positive	Small positive	All project roads and junctions
Better standards of living	-♦-	-♦-	Medium positive	Medium positive	All project roads and junctions
Negative impacts					
Anxiety generated by disclosure of information to the Community	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions
Biophysical					

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
impacts					
Positive impacts					
- (None)					
Negative impacts					
-					
Construction Phase					
Socio-economic impacts					
Positive impacts					
Direct employment opportunities	-♦-	-♦-	Medium positive	Medium positive	All project roads and junctions
Increased business opportunities	-♦-	-♦-	Medium positive	Medium positive	All project roads and junctions
Skills development	-♦-	-♦-	Medium positive	Medium positive	All project roads and junctions
Negative impacts					

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
Impact on property	To be assessed following RAP study	To be assessed following RAP study	To be assessed following RAP study	To be assessed following RAP study	All roads that will require dualling or any kind of expansion and junctions that will require expansion
Temporary loss of access to homes and businesses	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions
Loss of business, decrease in customers and income	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions where business premises will be affected.
Disruption of school activities	-♦-	-♦-	Medium negative	Minimal	All roads with schools close to

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
					the road.
Influx of people	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions
Impact on Vulnerable groups	-♦-	-♦-	Medium negative	Minimal	All project roads
Impact on gender	-♦-	-♦-	Medium negative	Minimal	All project roads
Disruption of traffic	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions
Disruption of public utilities and infrastructure	-♦-	-♦-	Medium negative	Minimal	All project roads
Impact on Occupational Health and Safety	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions
Impact on Community Health	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
and Safety					
Damage to buildings due to material extraction	-♦-	-♦-	Small negative	Minimal	Seyani stone quarry site
Impacts on physical cultural resources due to land take	-♦-	-♦-	Small negative	Minimal	All roads that will require dualling or any kind of expansion and junctions that will require expansion
Interruption/ Disturbances to intangible heritage resources	-♦-	-♦-	Small negative	Minimal	All project roads to be dualled or expanded
Impact on Historical Monuments/Built	-♦-	-♦-	Small negative	Minimal	All roads where monument built

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |-------|-------|	Negative Positive Large Medium Minimal/No Med. Large |-------|-------|-------|-------|			
Heritages					environment was recorded
Biophysical impacts					
Positive impacts					
Increase in fauna (bird) species diversity	-♦-	-♦-	Small positive	Minimal	All project roads and junctions
Negative impacts					
Loss of plant species and degradation of habitats	-♦-	-♦-	Medium negative	Minimal	Port bell Road, Spring road, Nakawa Ntinda road and Acacia Avenue
Proliferation of invasive species of plants	-♦-	-♦-	Large negative	Medium negative	All roads where large or relatively large expanse of

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |-------|-------|	Negative Positive Large Medium Minimal/No Med. Large |-------|-------|-------|-------|			
					natural vegetation was observed
Displacement of birds	-♦-(Port bell road) -♦- (other roads to be dualled)	-♦-	Small negative	Minimal	All project roads to be dualled including Nakawa Ntinda, Bukoto-Ntinda, Acacia Avenue, Port bell road, and A109
Reduction in number of fauna species	-♦-(Port bell road) -♦- (other roads to be dualled)	-♦-	Medium negative (Port bell road) Small negative (other roads)	Minimal	All project roads to be dualled including Nakawa Ntinda, Bukoto-Ntinda, Acacia Avenue, Portbell road, and A109
Low fauna	-♦- (all roads and	-♦-	Small negative	Minimal	All roads and

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
productivity rates	junctions where species of conservation concern (C-Species) were observed. -♦- (roads and junctions where no C-species were observed)				junctions except Ndeeba Junction and Bank of Africa Luzira
Displacement of soil/earth material and cliff formation at borrow sources	-♦-	-♦-	Small negative	Minimal	All roads to be dualled or raised
Change in geological substructure	-♦-	-♦-	Small negative	Minimal	All roads to be dualled or raised

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
Soil pollution	-♦-	-♦-	Small negative	Minimal	All roads with gardens by their sides.
Alteration of Drainage	-♦-	-♦-	Medium negative	Medium negative	All roads
Soil erosion and sedimentation (Siltation)	-♦-	-♦-	Medium negative	Small negative	All roads with water sources by their side including Mugema, Old Mubende, Sentema, Muzito, Ssuna road 2, A109, Port bell road, Wamala, Tuba, Kulambiro/Najeera,

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |-----|-----|	Negative Positive Large Medium Minimal/No Med. Large |-----|-----|-----|-----|-----|			
					Ntinda/Nakawa, Kirombe and Spring road
Water pollution due to oil spills/inadequate sanitary facilities and waste material besides spoil	-♦-	-♦-	Small negative	Minimal	All roads with water sources by their side including Mugema, Old Mubende, Sentema, Muzito, Ssuna road 2, A109, Port bell road, Wamala, Tuba, Kulambiro/Najeera, Ntinda/Nakawa,

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
					Kirombe and Spring road
Air pollution	-♦-	-♦-	Medium Negative	Minimal	All project roads and junctions
Depreciation in visual scenery of roads	-♦-	-♦-	Small negative	Minimal	All project roads and junctions
Post-construction phase					
Socio-economic impacts					
Positive impacts					
Improved mobility of vehicles, reduction in travel time and reduced traffic	-♦-	-♦-	Very large positive	Very large positive	All project roads and junctions

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
congestion					
Reduced vehicle wear and tear thus reduced maintenance costs	-♦-	-♦-	Medium positive	Medium positive	All project roads and junctions
Reduction in dust levels	-♦-	-♦-	Very large positive	Very large positive	Roads to be upgraded to paved
Improved access to health services	-♦-	-♦-	Very large positive	Very large positive	All project roads and junctions
Increase in value of land and property along the roads	-♦-	-♦-	Medium positive	Medium positive	All project roads
Land development	-♦-	-♦-	Medium	Medium	All roads that still

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
and more business opportunities			positive	positive	have sections that are unbuilt
Improved sanitation and a reduction in related diseases	-♦-	-♦-	Medium positive	Medium positive	Roads with currently poor drainage channels and poor sanitation
Street lighting	-♦-	-♦-	Very large positive	Very large positive	All project roads and junctions
Improved Scenic Beauty/Aesthetics	-♦-	-♦-	Medium positive	Medium positive	All roads to be paved
Tourism attraction	-♦-	-♦-	Medium positive	Medium positive	All project roads and junctions
Negative impacts					
Loss of jobs	-♦-	-♦-	Medium	Minimal	All project roads

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
			negative		and junctions
Blocking of access to homes and other public places	-♦-	-♦-	Medium negative	no	All project roads
Increase in traffic on some roads	-♦-	-♦-	Medium negative	Minimal	Kabuusu-Kitebi-Bunamwaya and Ssuna II roads
Risk of accidents due to over speeding	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions
Biophysical impacts					
Positive impacts					
-					
Negative impacts					
-					
Cumulative impacts					
Increased exposure	-♦-	-♦-	Small negative	Minimal	All project roads

Impact	Value of affected element	Impact Magnitude	Overall impact Assessment (before mitigation)	Overall impact Assessment (after mitigation)	Road/junction to which impact applies
Scale	Low/Med/High |.....|.....|	Negative Positive Large Medium Minimal/No Med. Large |.....|.....|.....|.....|			
to noise					and junctions
Increased disruption of traffic	-♦-	-♦-	Very large negative	Medium negative	All project roads and junctions
Increased loss of plant species and degradation of habitats	-♦-	-♦-	Medium negative	Small negative	Port bell Road, Spring road, Nakawa Ntinda road and Acacia Avenue
Increased air pollution	-♦-	-♦-	Medium negative	Minimal	All project roads and junctions

8. CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Introduction

Environmental Management involves reducing the significance of adverse environmental and social impactsassociated with the project through implementation of proposed mitigation measures. It can also involve enhancement of the positive environmental and social impacts of the project. It also involves checking if recommended mitigation measures are being implemented and checking the effectiveness of the mitigation measures through monitoring. Monitoring also involves identification of any unforeseen impacts at the time of conduct of the ESIA. Suggestions to improving the effectiveness of mitigation measures and proposals to mitigate unforeseen impacts are given. Monitoring is a long-term process, which should begin at the start of construction and should continue throughout the life of the project.

An Environmental and Social Management Plan (ESMP) (Table 58) was developed for the project. It contains actions that should be undertaken by the Developer to ensure minimal adverse impact of the project on the environment and on the communities.

8.2 Specific objectives of the ESMP

- Assist in ensuring continuing compliance with Ugandan legislation;
- Provide a mechanism for ensuring that measures identified in the ESIA to mitigate potentially adverse impacts are implemented
- Provide assurance to regulators and stakeholders that their requirements with respect to environmental and socio-economic performance will be met; and
- Provide a framework for KCCA compliance auditing and inspection programs.

8.3 Roles and Responsibilities

8.3.1 Kampala Capital City Authority

Although the contractors will have the primary roles in delivering on the measures set out in the ESMMP, the Developer (KCCA) will have the ultimate responsibility for ensuring that measures are delivered. In this respect, the developer will review and approve contractor's plans for delivery of the actions contained in the ESMMP and subsequently during the project construction phase, will review contractor performance through monitoring, audits and inspection. The Directorate of Gender and Community Services and Production will be key in ensuring compliance to environmental and social safeguards of the project. During operation, The Directorate of Public Health Services and Environment will take lead in ensuring that discipline in garbage disposal by the communities. It will ensure that garbage is not littered in the newly constructed water drainages.

The Directorate of Legal affairs will be key in handling of criminal cases during both the construction and operation phases. The Contractor will work in close collaboration with this Directorate to reduce thefts of project materials during construction and any sabotage on built infrastructure during operation.

KCCA is also expected to ensure planning and implementation of the following:

- Continuous sensitisations of communities along the project roads in regard to extents of road reserves and acceptable activities therein. This would in future reduce on illegal operations within KCCA's road's reserves.
- Have and implement anti-theft measures against theft of street lights.
- Provide adequate notice to vacate to property owners and communities operating within the required land. This should be between 3-6months or as required by the law.
- Plan for construction of additional legally recognized markets to reduce on the number of people illegally operating along roads.
- Improve on the methods of tax collection to redeem the image of KCCA among people operating along the different roads.

8.3.2 Supervising Consultant

During preparation, construction and operation of the project, an Environmental Management Specialist/ environmentalist (EMS) who will be part of the supervising Consultant's Team, will be responsible for ensuring that the overall objectives of the environmental mitigation measures are met. A Sociologist who will also be part of the supervising Consultant's Team will be responsible for overall achievement of socio-economic mitigation and enhancement aspects.

The supervising consultant's EMS, and Sociologist will report to the supervising consultant's engineer who has the power to stop the work at any time in case the actions established in the ESMP or otherwise required are not adhered to.

8.3.3 The Contractor

The developer will ensure that contractors are reputable, legitimate and have in place an appropriate Environment and Social Management System. During site preparation, construction, operation and decommissioning, the Contractor will be responsible for ensuring compliance with all relevant legislation (highlighted in Chapter 5 of the ESIA Report) as well as adherence to all environmental and socio-economic mitigation measures specified in the ESMP. The Contractor is also responsible under the contract for managing the potential Environmental, socio-economic,

safety and health impacts of all project activities whether these are undertaken by themselves or by their sub-contractors.

The Contractor will also be expected to demonstrate commitment to the ESMP at all levels in the contractor's management structure. The contractor will be required to have in place individuals responsible for overall environment management (including community liaison) and, safety and health management. The team could include Environment, Health and Safety (EHS) Officer and a Community Liaison Officer. The contractor's community liaison team will be required to work with the supervising consultant's Sociologist to implement the social aspects of the ESMP. The Contractor will be required to undertake regular environmental and socioeconomic Inspections and provide reports to the supervising Consultant (EMS) and sociologist to monitor and evaluate performance against the measures and objectives established in the ESMP.

The contractor's community liaison team will be expected to work closely with KCCA's Directorate of Gender to implement the Stakeholder Engagement Plan.

8.3.4 Government Bodies and Utility Service Providers

Government bodies including NEMA, MoLHUD, MoGLSD, MoWT, MTA (Department of Museums and Monuments), Police, Petroleum Supply Department, Local authorities and utility service providers (NWSC, Telecommunication companies, UMEME) have monitoring roles as provided in Table 55.

8.4 Stakeholder Involvement

KCCA should continue to engage with the stakeholders throughout the project cycle. A system should be established with the stakeholders to ensure that stakeholders receive information on the progress of work and its implications, employment and others. This structure will be fully established when Resettlement Action Plan (RAP) has been completed and the actual affected people are known as they form the major part of this structure. Grievances will be handled through the structure that will be established by the project and the existing Local Council system. The Contractor shall also be required to have a Stakeholder Engagement Plan and Grievance Management Plan throughout the construction phase. Appendix XVIII presents a sample grievance management plan that the contractor could make reference to and build on during preparation of his.

8.5 Reporting

Annual reports containing all data obtained during the environmental monitoring throughout the year will be submitted to NEMA by the developer up to the end of the construction period.

During operation, monthly monitoring reports prepared by the Developer or its consultant will be submitted to NEMA by the developer.

Table 58: Environmental and Social Management Plan

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Preconstruction phase							
Socio-economic impacts							
Positive impacts							
Employment opportunities	Give priority to the locals for the few available job opportunities	Consultant	Costs for dissemination of information about available job opportunities Part of Consultant's costs	Jobs given to locals	Once during pre-construction phase	KCCA	
Better standards of	Adequate compensation to enable better standards of	- Consultant -Chief	Compensation costs	PAPs with better housing	After implementati	Ministry Lands, Housing and	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
living	living for project affected persons.	Government Valuer's (CGV's) office	Part of RAP costs	and bigger pieces of land especially the vulnerable	on of the RAP	Urban Development (MoLHUD)	
Negative impacts							
Anxiety generated by disclosure of information to the Community	Dissemination of thorough information regarding land acquisition and compensation to the community especially during the preparation of the RAP and any other relevant project information throughout all phases of the project. During the RAP preparation and implementation phases, information about land take and acquisition will be disseminated to the right people e.g. family members –	Consultant / KCCA	Consultation for the RAP phase are catered in the RAP Consultant's costs.	Number of meetings held during the RAP preparation phase and throughout the project phases	Monthly during RAP phase and throughout construction	KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	property owners, spouses, children etc.						
Impact from Relocation of utilities (electric poles, water pipes, etc)	The Contractor will need to prepare a utility relocation plan and liaise with the utility providers to carry out temporary or permanent relocation, and to protect the utility infrastructure to ensure minimal damage and disruption of services,	-Contractor -KCCA -Public utilities agencies e.g. (MTN, Airtel, NWSC).	Costs for preparation of a utility relocation plan Costs given by utility agencies	Utility relocation plan in place	Before construction commences	Utility service providers KCCA Supervising Consultant	
	Damage to the water sources will be avoided wherever possible. If not possible, plans to provide alternative water sources will be made by KCCA	Contractor	Costs for provision of replacement water sources Part of contractor budget	Number of Alternative water sources replaced	Daily by Contractor Monthly by Consultant and KCCA	Contractor KCCA, Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Consultations with the utility service providers will be commenced right from the design stages to ensure that all the utility services within the alignment are relocated before the commencement of the Works	-Design Consultant -KCCA -Contractor	Costs for consultations Part of Consultant and Contractor's budget	Utility companies consulted	Quarterly	KCCA	
	Liaise with utility owners to provide early warning to the communitiees about any possible disruption in service provision for the different utilities. Existing communication channels such as phone text messages to consumers, media announcements could be utilised.	Contractor Utility Companies	Contractor's budget	No. of media announcements made. No. of times text messages sent out to consumers.	Monthly	KCCA Utility owners Contractor Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Biophysical impacts							
Positive impacts							
-							
Negative impacts							
-							
Construction phase							
Socio-economic impacts							
Positive impacts							
Direct employment opportunities	Timely and continuous information dissemination about the existing job opportunities and any other	- Contractor - KCCA - Town Clerks / Sub County	Costs for dissemination of information about available	Number of announcements made for the available jobs	Continuously during construction phase	KCCA/ Consultant Local leaders	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	opportunities besides the jobs such as sourcing of materials and supplies. The contractor will use effective communication methods so as to ensure that the message reaches the intended people (See section 3.2.3.8 with recommendations on communication channels that reach a wider section of the population).	officers - District community development officer	job opportunities Part of contractor's budget				
	The contractor to present a transparent recruitment plan. The recruitment procedures must provide equal opportunity for all including females.	Contractor	Costs for drafting of recruitment plan Part of contractor's	Recruitment Plan in place.	Continuously during construction phase	KCCA/Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget				
	Employment opportunities will be extended to the interested people along the different roads.	- Contractor - Town Clerks / Sub County officers - District community development officer	Costs for dissemination of information about available job opportunities Part of contractor's budget	Number of local people employed	Continuously during construction phase	KCCA/ Consultant Local leaders	
	The Contractor will prepare and implement and Sexual Harassment Policy so as to avoid any kind of sexual harassment for the workers.	- Contractor	Costs for labour Part of contractor's budget	Sexual Harassment Policy in place and disseminated to the workers. No. of sexual harassment	Beginning and monthly	KCCA / Consultant Ministry of Gender , Labour and social development	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
				cases reported.			
	The Contractor will provide fair working conditions and environment as required by the Employment Act e.g. workers will be allowed to rest, take leave e.g. annual, sick leave, fair pay etc. The implementing agency will have to approve the Worker's Recruitment Plan including the proposed wages for the workers.	- Contractor	Costs for labour Part of contractor's budget	Recruitment plan clearly stipulating the rights of workers.	Beginning and monthly	KCCA / Consultant	
	There will be no forced labour at the project site.	- Contractor	Costs for labour Part of contractor's budget	No. of cases reported about forced labour.	Quarterly	KCCA / Consultant, Ministry of Gender, Labour and social development	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	There will be no child labour at the project site. All employees will be aged 18 years and above as required by the Children's Act.	- Contractor	Costs for labour Part of contractor's budget	No. of employees below 18 years	Quarterly	KCCA / Consultant,	
Increased business opportunities	Give priority to local companies when outsourcing construction materials.	Contractor	Costs for labour Part of contractor's budget	Source of construction materials	Thrice during construction	KCCA/ Consultant	
Skills development	Provision of on-job training for the workers (unskilled and semi-skilled) in various areas of construction. This could be achieved through deliberately placing unskilled with semi-skilled personnel and semi-skilled with skilled workers.	Contractor	Costs for on job training Part of contractor's budget	Number of unskilled workers attached with semi-skilled workers or skilled workers	Twice in the first quarter of construction	KCCA/Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Negative impacts							
Impact on property	A detailed Resettlement Action Plan will be prepared and implemented in accordance with national laws and international guidelines and principles. The Plan will clearly set out the land acquisition and resettlement procedure highlighting all available alternatives for compensation.	-RAP Consultant -Chief Government Valuer's office	Costs for preparation of a RAP Covered under consultant's budget	Resettlement Action Plans prepared and implemented	Before commencement of construction activities	KCCA Ministry of Lands, Housing and Urban Development (MoLHUD)	
Temporary loss of access to homes and businesses	Handle sections of the road to shorten the period of disruption.	Contractor	-	Road works in sections	Monthly by Consultant and KCCA	KCCA Consultant	
	Access to existing businesses will be maintained by creating temporary driveways, and/or providing alternate access	Contractor	Cost for temporary accesses	Temporary accesses provided	Daily by Contractor Monthly by Consultant	Contractor KCCA Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	points.		Part of contractor's budget		and KCCA		
	Restore the accesses after construction.	Contractor	Costs for restoring accesses Part of contractor's budget	Restored accesses	Daily by Contractor Monthly by Consultant and KCCA	Contractor KCCA Consultant	
Loss/disruption of business, decrease in customers and income	Compensate the owners of business premises adequately to enable them replace the buildings.	-KCCA -RAP Consultant -Chief Government Valuer's office	Compensation for demolished business premises Part of RAP costs	Number of owners of business premises compensated adequately	Before commencement of construction activities	KCCA MoLHUD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Provide ample time e.g. 3-6 months for the business owners, boda-boda and taxi operators to look for alternative business premises	KCCA	Costs for notifying business owners Part of RAP costs	Adequate time provided as per the national laws and regulations.	Before commencement of construction activities	KCCA MoLHUD	
Disruption of school activities	Wherever practical, the contractor will schedule construction near schools on weekends.	Contractor	Costs for drawing of schedules Part of contractor's budget	Construction near schools conducted over weekends	Daily by Contractor Monthly by Consultant and KCCA	Contractor Consultant KCCA	
	Wherever this risk exists, the contractor will screen off schools to avoid accidents.	Contractor	Costs for screens Part of	Number of schools screened off.	Daily by Contractor Monthly by	Contractor Consultant KCCA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			contractor's budget	Number of meetings held with school administrators	Consultant and KCCA		
	The contractor will engage school administrators to sensitize pupils/students about the risks associated with the road construction and necessary precautions they need to undertake.	Contractor	Costs for engagement of school administrators Part of contractor's budget	Number of meetings held with school administrators	Daily by Contractor Monthly by Consultant and KCCA	Contractor Consultant KCCA	
	Disseminate information regarding the work plan for construction activities along sections with schools in a timely manner to enable the school administrations make any necessary plans that they	Contractor	Costs for engagement of school administrators Part of contractor's	Construction work plan disseminated to schools	Monthly	KCCA/ Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	may see fit e.g. sensitization of their pupils and students etc.		budget				
	Project workers especially drivers will continuously be sensitized and reminded to be extra careful especially when working close to schools.	Contractor' EHS	Labour costs Part of contractor's budget	No. of sensitisations held for project workers and drivers	Monthly	KCCA/ Consultant	
	During construction, the contractor should use noise barriers especially on roads near schools, hospitals etc.	Contractor	Part of contractor's budget	Noise barrier	Daily by Contractor, Monthly by KCCA/ Consultant	Contractor, KCCA/ Consultant	Contractor to follow the 'Environmental barrier design process' under Volume 10 section 5 part 1
	Use of flagmen at the construction site near schools to control traffic and reduce noise levels	Contractor	Costs for traffic management	Flagmen in areas near schools	Daily by Contractor, Monthly by KCCA/	Contractor, KCCA/ Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Part of contractor's budget		Consultant		
Influx of people	The contractor will provide adequate sanitation facilities for workers on each road. The project being linear in nature, the distance between these facilities will be short to avoid workers trekking long distances to access them.	Contractor	Costs for provision of sanitation facilities Part of contractor's budget	Facilities in place for the project workforce.	At the beginning of the project, then quarterly	Contractor, KCCA / Consultant Local authorities at Division level	
	A Waste Management Plan will be in place and implemented by the contractor with strict supervision from KCCA.	Contractor KCCA	Costs for preparation of a waste management plan Part of	Evidence of a Contractor's Waste Management Plan Evidence of	Before construction and quarterly checks	Contractor, KCCA / Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Contractor's budget	implementation of the recommendations			
	Collaborate with the local security in the area to ensure safety of project materials	Contractor Local police	Costs for hiring utilizing local security Part of contractor's budget	Number of meetings held with the local security (police).	Daily by contractor and monthly by KCCA and Consultant	Developer / Consultant and Contractor	
	Put in place an internal control system to curb cases of theft of materials	Contractor	Cost for an internal control system Part of contractor's budget	Security internal control system in place	Before commencement of construction and daily by contractor during the construction and monthly	Contractor, Developer / Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					by KCCA/Consultant		
	The Contractor will have a comprehensive HIV/AIDS Management Plan for its workers informed by a baseline. This will help to reduce the risk of spreading the disease e.g. provision of condoms, free testing and counselling services, HIV/AIDS awareness programs etc.	Contractor	Cost for preparation of an HIV/AIDS prevention plan and its implementation Part of contractor's budget	Evidence of Contractor's HIV/AIDS Prevention Plan and evidence of its implementation	Before commencement of construction and Quarterly during construction	Contractor, KCCA's Supervising Consultant	
	HIV/AIDS awareness programs on radio or television plus any other methodology to disseminate the information to	KCCA/Contractor	The budget includes costs for IEC materials and	No. of outreach campaigns held IEC materials	Bi-annual	Ministry of Health	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	the community. An independent NGO will be procured by KCCA to carry out the awareness.		outreach campaigns Part of contractor's budget	distributed			
	The contractor will have a code of conduct for its workers to minimize some of the risks.	Contractor	Cost of preparation of a code of conduct Part of Contractor's budget	Contractor's Code of Conduct in place	At the beginning of construction	KCCA/ supervising Consultant MoGLSD	
	Minimize stagnant pools of water as much as possible by ensuring that trenches are not left open for a long time.	Contractor	Costs for back filling trenches and pools	Duration trench is left open	Monthly during construction	KCCA/ supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Part of contractor's budget				
	Information dissemination to the interested communities and local leaders along each road about the available jobs.	Contractor	Costs for information dissemination Part of contractor's budget	Number of meetings held with the communities and the local leaders	Monthly during construction	Contractor, KCCA/ Supervising Consultant	
	A Grievance Resolution Mechanism / Plan will be prepared and implemented by the Contractor for use by the concerned parties. Local authorities at Sub County and village levels will be involved in the solving of grievances. As a minimum the Grievance	Contractor	Costs for development of mitigation management plans Part of contractor's budget	Grievance Management Plan in place Number of grievances / complaints received Number of	Before commencement of construction Monthly by KCCA and consultant Daily by	KCCA / Consultant Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Resolution Mechanism / Plan will consist of a point of contact to receive the grievances, responsible persons to solve the different categories of cases and proper and clear channels for feedback.			grievances solved Number of grievances /conflicts not solved.	contractor		
	Prepare and implement a Stakeholder and Citizen Engagement Plan to help in the management of community expectations and any other issues that may arise.	Contractor	Costs for stakeholder engagement Part of contractor's budget	Stakeholder Engagement Plan. Stakeholders engaged with. No. of meetings held with stakeholders.	Start of construction Quarterly	KCCA KCCA/Consultant	
	The contractor will have a comprehensive social	Contractor	Costs for social	Social Management	Start of construction	KCCA/Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	management plan informed by a baseline and stakeholder engagement to manage social vices both for local and international staff		management Part of contractor's budget	Plan			
	Contractor will ensure that there are toilet facilities on site for both males and females	Contractor	Costs for workers' facilities Part of contractor's budget	Toilet facilities for both males and females	Start of construction Monthly	KCCA/Consultant	
	Contractor will ensure that no children are employed on site.	Contractor	Costs for labour Part of contractor's budget	No. of employees aged below 18 years	Start of construction Quarterly	KCCA/Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Impact on Vulnerable groups	Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly.	Contractor Supervising consultant	Cost for reaching out to vulnerable groups Part of contractor's budget and supervising consultant's budget	Number of women involved in project activities	Quarterly during construction	Contractor, KCCA / Supervising Consultant MoGLSD	
	The affected vulnerable households will be compensated fairly and adequately.	- KCCA -RAP Consultant -Chief Government Valuer's Office	Compensation for affected vulnerable households Part of RAP Budget	Compensated vulnerable households	Before commencement of project activities	KCCA MoGLSD	
	Livelihood restoration	-KCCA	Costs for	Livelihood	Quarterly		

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	strategies will be extended to the vulnerable groups and their income levels monitored closely during the implementation process.	-RAP implementation consultant	livelihood restoration strategies and monitoring of income levels Part of RAP budget	restoration strategies extended to vulnerable groups	throughout construction and after construction for a period of 2 years.	KCCA MoGLSD	
	Equal distribution of jobs to all including vulnerable households.	Contractor -Local leaders e.g. Community Development Officers, LC I officers	Costs for Information dissemination about employment opportunities Part of contractor's budget	Employed vulnerable households	Quarterly during construction	KCCA, Consultant MoGLSD	
	There will be no forced labour or child labour at the project	-Contractor -Local leaders	Costs for labor	Evidence that no children are	At the start of the project	KCCA, Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	site. All employees will be aged 18 years and above. Furthermore, employment records will be disaggregated by age and sex.		Part of the Contractors' costs for labour	employed and no forced labour. Monitored through number of complaints received from workers, communities, HR records	and monthly for KCCA/Consultant and quarterly for MoGLSD	MoGLSD	
Impact on gender	Jobs will be equitably distributed to both women and men as long as one has the qualification rather than basing on gender to allocate jobs. Employment records disaggregated by sex will be kept by the Contractor and easily accessed by the	-Contractor -Local leaders e.g. Community Development Officers, LC I officers	-	Number of men and women employed	Quarterly	KCCA/ Consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	monitoring and supervising team						
	Information dissemination about dangers of HIV/AIDS to the community will be done all throughout the period of the project. The messages will be passed on using the locally understood language for better understanding and the main means of information access to make them effective	-KCCA Contractor -RAP Consultant -CGV's office -Local leaders e.g. Community Development Officers, LC I officers	Costs for HIV/AIDS information dissemination Part of contractor's budget and cost for Radio or television programs above	Evidence of HIV/AIDS information dissemination to the communities	Quarterly	KCCA/ Consultant MoGLSD	
	Workers will be sensitized to desist from any sexual relations with the local people to avoid cases of family break ups	Contractor	Costs for sensitization of workers. Part of	Evidence of meetings with workers to discuss sexual harassment	At the start of construction then quarterly	KCCA/ Consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			contractor's budget	issues.			
	A Sexual Harassment Plan will be developed by the Contractor before start of the construction and its contents distributed and disseminated to all workers. This plan will include items like; key point of contact e.g. Human Resource Manager, Health and Safety Manager or Community Liaison Office; procedure for reporting, incident referral plan, mitigation measures and penalties to the culprits etc.	Contractor	Part of contractor's budget	A Sexual Harassment Plan	Before commencement of construction	KCCA	
	Prompt and effective remedial action will be taken after	-Contractor -Local leaders	Part of contractor's	Number of sexual	Quarterly	KCCA/ Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	investigating the sexual harassment claims.	e.g. LC I Chairpersons	budget	harassment cases reported. Type of remedial action taken		MoGLSD	
	Sensitization of employees and supervisors about sexual harassment will be undertaken at the beginning of the construction so as to avoid any would be cases for sexual harassment. In addition, continuous reminders will be made from time to time.	Contractor	Employee sensitization costs Part of contractor's budget		At the beginning and then quarterly.	KCCA/ Consultant MoGLSD	
	Display of clear and visible posters on reporting channels at the respective construction offices and along sections of the different roads.	Contractor	Costs for signs and posters Part of contractor's	Evidence of sexual harassment posters displayed in the	Monthly Daily by Contractor	KCCA/ Consultant MoGLSD Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget	chosen areas.			
Disruption of traffic	A Traffic Management Plan (TMP) will be implemented during project construction. Specific elements of the TMP will include but not limited to the following: the use of flaggers and temporary lane realignments to maintain through traffic, concrete barriers, signage to direct traffic movements, and possible reduction of speed limits in construction zones. It will aslo include a description of measures to be taken to protect pedestrians and community health and safety mitigation measures	Contractor	Cost for development of a traffic management plan Part of contractor's budget	Traffic management plan in place	Before construction commences	Contractor KCCA Supervising Consultant Ministry of Works and Transport (MoWT)	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	.						
	Traffic can be accommodated by means of stop/go conditions in partial-width construction wherever possible.	Contractor	Cost for traffic guiding Part of contractor's budget	Proper flow of traffic	Daily by Contractor during construction Monthly by Consultant Monthly by KCCA - Quarterly by MoWT	Contractor KCCA Supervising Consultant Ministry of Works and Transport (MoWT)	
	Inform road users about location of road works and advise on use of alternative existing roads which will be mentioned	Contractor	Costs for announcements	Proper flow of traffic	- Quarterly by MoWT and KCCA	Ministry of Works and Transport (MoWT) -KCCA	
	Coordination with traffic police in traffic management	Contractor	Costs for traffic control Part of	Traffic police helping with traffic management	Daily by Contractor, Monthly by KCCA	Contractor KCCA Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			contractor's budget		Monthly by Consultant		
	Deployment of flag men to control traffic flow at all project sub component sites	Contractor	Costs for traffic control Part of contractor's budget	No. of flagmen recruited / deployed	Daily by Contractor, Monthly by KCCA Monthly by Consultant	Contractor KCCA Supervising Consultant	
Disruption of public utilities and infrastructure	The Contractor will need to prepare a utility relocation plan and liaise with the utility providers to carry out temporary or permanent relocation, and to protect them to ensure minimal damage and disruption of services,	-Contractor -KCCA -Public utilities agencies e.g. (MTN, Airtel, NWSC).	Costs for preparation of a utility relocation plan Costs given by utility agencies	Utility relocation plan in place	Before construction commences	Utility service providers KCCA/ Supervising consultant	
	Damage to the water sources will be avoided wherever possible. If not possible, plans to provide alternative water	Contractor	Costs for provision of replacement water sources	Number of Alternative water sources provided	Daily by Contractor Monthly by Consultant/	Contractor KCCA/consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	sources will be made by the implementing agency.		Part of contractor budget		KCCA		
	Consultations with the utility service providers will be commenced right from the design stages to ensure that all the utility services within the alignment are relocated before the commencement of the Works	-Design Consultant -KCCA -Contractor	Costs for consultations Part of Consultant and Contractor's budget	Utility companies consulted	Quarterly	KCCA	
	Liaise with utility owners to provide early warning to the communitiees about any possible disruption in service provision for the different utilities. Existing communication channels such as phone text messages to	Contractor Utility Companies	Contractor's budget	No. of media announcements made. No. of times text messages sent out to consumers.	Monthly	KCCA Utility owners Contractor Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	consumers, media announcements could be utilised.						
Impact on Occupational Health and Safety	An Occupational Health and Safety Management Plan will be put in place by the contractor before commencement of the project and will implement its provisions. The Safety Plan will put into consideration the safety procedure in case of accidental bursts of sewage pipes. Workers will at all times wear PPE.	Contractor	Costs for development and implementation of an Occupational Health and Safety Management Plan Part of contractor's budget	Health and Safety Management Plan in place.	At the beginning of the construction	Contractor, KCCA/Supervising consultant MoGLSD	
	Contractor to work in close collaboration with NWSC in the event that sewage pipes break or to minimize the	Contractor	Costs for relocation of public utilities Part of	-Collaboration with NWSC	Monthly during construction	KCCA, NWSC	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	possibility as much as possible.		contractor's budget				
	Disseminating of relevant safe working procedures to all workers	Contractor	Costs for dissemination of information Part of contractor's budget	Evidence that safe working procedures were passed on to the workers.	At the beginning of the construction and Daily by contractor Monthly by KCCA/Consultant and quarterly by MoGLSD	Contractor, KCCA/Supervising consultant MoGLSD	
	Provision of appropriate Personal Protective Equipment (PPE) to the workers e.g. ear muffs, overalls, nose masks, helmets, safety boots, safety	Contractor	Costs for PPE Part of contractor's budget	Evidence of workers using PPE	Daily by Contractor Monthly by KCCA/Supervising	Contractor, KCCA/Supervising consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	jackets				consultant Quarterly by MoGLSD		
	Labelling of danger zones and hazardous materials	Contractor	Costs for danger zone labels Part of contractor's budget	Evidence of labelling the danger zones and hazardous materials	Daily by Contractor Monthly by KCCA/Supervising consultant Quarterly by MoGLSD	Contractor, KCCA Supervising consultant MoGLSD	
	Restrictions/control of access to potential danger zones or usage of hazardous chemicals	Contractor	Costs for restriction zone labels Part of contractor's budget	Evidence of restrictions to danger zones	Daily by Contractor Monthly by KCCA/Supervising consultant Quarterly by	Contractor, KCCA Supervising consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					MoGLSD		
	An Emergency Response Plan /Contingency Plan taking into consideration all emergencies will be prepared before the commencement of the project. This will be communicated to all workers.	Contractor	Cost for preparation of an Emergency response plan Part of contractor's budget	Emergency Response Plan in place and Evidence of dissemination of information to the workers	Before start of construction	Contractor KCCA/Supervising consultant MoGLSD	
	All construction equipment used for the execution of the project works will be fit for purpose and carry valid inspection certificates and insurance requirements.	Contractor	Cost for inspection and insurance Part of contractor's budget	Inspection certificates	Before start of construction	KCCA	
	Risk assessment will be prepared and communicated prior to commencement of	Contractor	Cost for risk assessment	Risk assessments done	At the start of the construction	KCCA/Supervising consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	work for all types of work activities on site.		Part of contractor's budget		and during construction wherever deemed fit		
	Ensure all plant machines and vehicles are regularly inspected, serviced and maintained. All staff assigned to operate project machines and vehicles will be trained and competent for such a job.	Contractor	Cost for inspection and servicing of vehicles and training of staff where need be Part of contractor's budget	Serviced vehicles	Daily by Contractor and monthly by Consultant and KCCA and quarterly by MoGLSD	Contractor KCCA/Supervising consultant MoGLSD	
	First Aid kits with the relevant medicines and equipment e.g. adhesive bandages, antibiotic ointment, cotton wool, pain	Contractor	Cost for first Aid kits Part of	Availability of First Aid kits	Daily by Contractor Monthly by KCCA/Supe	Contractor KCCA/Supervising consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	killers, non-latex gloves, scissors, thermometer, etc. will be made available by the contractor on site.		contractor's budget		rvising Consultant and quarterly by MoGLSD		
	An accident log will be put at each construction site to record and monitor any accidents.	Contractor	Cost for risks Part of contractor's budget	Accident log			
	Wear visible apparel to reduce on the risk of accidents due to poor visibility.	Contractor	Costs for workers' attire Part of contractor's budget	No. of workers with visible attire			
	Prepare a Site Traffic Management Plan for workers' camps clearly showing management of pedestrian walkways and parking for	Contractor	EHS costs Part of contractor's budget	Site Traffic Management Plan			

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	project vehicles.						
	Inform and apply site safety procedures to visitors to the site.	Contractor	EHS costs Part of contractor's budget	No. of visitors informed about site safety procedure	Daily by Contractor, Monthly by Supervising consultant.	Contractor KCCA/Supervising consultant	
	Regular vision tests for drivers. Regular impairment testing for drivers (drug, alcohol).	Contractor	EHS costs Part of contractor's budget	Vision tests carried out Impairment tests carried out	Quarterly Monthly	Contractor KCCA/Supervising consultant	
	Regular inspection to ensure the implementation of the recommendations / provisions of the Management Plans and assessment of compliance with the requirements.	-Consultant -KCCA	Cost for inspection Part of Supervising consultant's budget	Evidence of implementation of mitigation plans and compliance	Daily by Contractor and monthly by Consultant and KCCA	Contractor KCCA/Supervising consultant	
	Regular reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or	Contractor	Cost for reporting Part of contractor's	EHS Reports	Daily by Contractor Monthly by KCCA/Supe	Contractor KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again.		budget		rvising Consultant		
	High noise producing machinery will be fitted with silencers	Contractor	Cost of silencers Part of contractor's budget	Silencers on high noise emitting machinery Noise levels	Daily by Contractor and monthly by KCCA/Supervising consultant during construction Quarterly for assessment of noise levels by KCCA/Supe	Contractor KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					rvising consultant		
	Noise intensive works such as excavation, movement of project vehicles will be scheduled for the least noise-sensitive time of the day (work between 7:00am to 6:00pm) since the noise impact is less felt during day than during the night.	Contractor	-	Noise intensive works scheduled for day time	Daily by Contractor during construction	Contractor	
	Limit the speed of project vehicles to 30km/hr. to help minimize the increase in noise levels. To ensure adherence to the set speed limit, speed humps will be put in place where necessary along construction routes and penalty systems introduced.	Contractor	Cost for construction of speed humps along construction routes Part of contractor's budget	Drivers abiding by speed limits Speed humps in place	Daily by Contractor during construction and Monthly by KCCA/Supervising consultant	Contractor KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					during construction		
	Since the impact of noise increases with increase in exposure time, the work schedules for workers will also be designed to limit the exposure time. No worker will be exposed to noise level greater than 85dB (A) for a duration exceeding 8 hours per day as stated in the National Environment (Noise Standards and Control) Regulations, 2003.	Contractor		Noise levels and exposure time for workers	Daily by Contractor during construction and Monthly by KCCA/Supervising consultant during construction Quarterly for assessment of noise levels by KCCA/Supervising	Contractor KCCA/Supervising consultant	
	Conduct Environmental	Contractor/sup	Cost for EIAs	EIAs	Once before	KCCA/Superv	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Impact Assessments (EIAs) for material extraction activities	plier	Part of contractor/supplier's budget	conducted for material extraction	extraction of materials	ising consultant	
Impact on Community Health and Safety	Use of road signs & barriers to show the dangerous areas	Contractor	Cost for signs and barriers Part of contractor's budget	Evidence of signs and barriers in dangerous areas	Daily by Contractor Monthly Consultant and KCCA	Contractor KCCA/Supervising Consultant	
	Enforce restrictions on unnecessary entry into any protected zones	Contractor		No unnecessary entry into any protected zones	Daily by Contractor	Contractor	
	Follow the mitigation measures prescribed to reduce any dust or noise impacts	Contractor		Implementation of dust and noise mitigation measures	Daily by Contractor Monthly Consultant and KCCA	Contractor KCCA/Supervising Consultant	
	The Contractor will have an	Contractor	Cost for	Evidence of	Before start	KCCA/Superv	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	HIV/AIDS Prevention Plan for his workers and also implement it so as to reduce the risk of spreading the disease.		preparation of an HIV/AIDS prevention Plan Part of contractor's budget	Contractor's HIV/AIDS Prevention Plan and evidence of its implementation	of construction and quarterly	ising Consultant	
	Make provisions for pedestrian and non-vehicular traffic during construction periods.	Contractor	Cost for traffic guiding Part of contractor's budget	Evidence of provisions for pedestrian and non-vehicular traffic	Daily by Contractor Monthly Consultant and KCCA	Contractor KCCA/Supervising Consultant	
	Use of flagmen to direct the traffic to avoid any accidents.	Contractor	Cost for traffic guiding Part of contractor's budget	Number and evidence of flagmen employed	Daily by Contractor Monthly by Consultant and KCCA	Contractor KCCA/Supervising Consultant	
	All project vehicles and trucks	Contractor		Compliance	Daily by	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	will comply with the proposed speed limits i.e. 30-50 based on the road.			with speed limits	Contractor		
	The contractor will ensure that all project trucks and vehicles are operated by licensed operators.	Contractor		Licenses and driving permits for contracted drivers	At the beginning and throughout construction for any new recruitments	Contractor KCCA/Supervising Consultant	
	The Contractor to be extremely careful when relocating sewage pipes to avoid any accidental sewage bursts and their impacts to communities.	Contractor	Health and safety costs Part of contractor's budget	Incidents of sewage pipe bursts	Monthly	KCCA, NWSC	
	The Contractor will work closely with NWSC so as to ensure that risks associated with breaking of sewage pipes are minimised.	Contractor	Health and safety costs Part of contractor's	Collaborations with NWSC	Monthly	KCCA. NWSC	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget				
	Enhance community liaison for timely gathering of all the related community health and safety issues arising from project implementation	Contractor	Consultation costs Part of contractor's sensitization budget	Engagements with community leaders	Monthly	Contractor, KCCA/ Supervising Consultant	
	High noise producing machinery will be fitted with silencers	Contractor	Cost of silencers Part of contractor's budget	Silencers on high noise emitting machinery Noise levels	Daily by Contractor and monthly by KCCA/Supervising consultant during construction Quarterly for assessment of noise levels	Contractor KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					by KCCA/Supervising consultant		
	Noise intensive works such as excavation, movement of project vehicles will be scheduled for the least noise-sensitive time of the day (work between 7:00am to 6:00pm) since the noise impact is less felt during day than during the night.	Contractor	-	Noise intensive works scheduled for day time	Daily by Contractor during construction	Contractor	
	Conduct Environmental Impact Assessments (EIAs) for material extraction activities	Contractor/supplier	Cost for EIAs Part of contractor/supplier's budget	EIAs conducted for material extraction	Once before extraction of materials	KCCA/Supervising consultant	
Damage to buildings due	Rehabilitate any cracked house or build a new one in	Contractor/supplier of material	Cost for compensation	Complaints from affected	Monthly during	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
to material extraction	case of collapse and offer health aid to any affected victims.		Part of contractor/supplier's budget	persons	material extraction		
Impacts on physical cultural resources due to land take	In case of chance finds during construction activities the Chance finds procedure in provided in the report will be followed.	Contractor		Implementation of chance finds procedure in case of chance finds	Whenever chance finds are seen	Contractor KCCA/Supervising Consultant Ministry of Tourism and Antiquities (Department of museums and monuments)	
	Construction workers and managers will be trained on basic skills of how to identify and handle archaeological materials/artefacts before commencement of work.	Contractor Consultant	Cost for training Part of Consultant's budget	Evidence of trainings made on basic skills of how to identify and handle	Just before construction	KCCA/Supervising Consultant Ministry of Tourism and Antiquities	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
				archaeological materials/artefacts		(Department of museums and monuments)	
	All ground disturbing activities during construction of the proposed facilities will be monitored by a qualified archaeologist.	Contractor Consultant	Cost for monitoring Part of Consultant's budget	Presence of a qualified archeologist during ground disturbing activities	Daily during earth works by Contractor and Monthly by KCCA/Supervising Consultant	Contractor KCCA/Supervising Consultant	
	Any cultural resources (chance finds) discovered during construction will be tested to determine significance and mitigated through avoidance or data recovery.	Contractor Consultant	Cost for testing of significance of chance finds Part of contractor's budget	Evidence of testing of chance finds	Whenever chance finds are reported	KCCA/Supervising consultant Ministry of Tourism and Antiquities (Department of museums and monuments)	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Any artefacts or fossils (*Chance Finds*) impacted during construction will be repaired by the archaeological monitor to a point of identification.	Contractor Consultant	Cost for identification of chance finds Part of Consultant's budget	Repaired and identified chance finds	Whenever chance finds are reported	KCCA/Supervising consultant Ministry of Tourism and Antiquities (Department of museums and monuments)	
	During constructions the contractor will mark the buffer zones to minimise any damage.	Contractor	Cost for marking of buffer zones Part of contractor's budget	Delineated area to be excavated	Daily during construction by Contractor and Monthly by KCCA/Supervising Consultant	Contractor KCCA/Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Impact on Historical Monuments/ Built Heritages	Implementation of mitigation for impact on air quality and increase in noise levels	Contractor	Cost for Implementation of mitigation for impact on air quality and increase in noise levels Part of contractor's budget	Evidence of Implementation of mitigation for impact on air quality and increase in noise levels	Daily during construction by Contractor and Monthly by KCCA/Supervising Consultant	Contractor KCCA/Supervising Consultant	
	Discussions will be held with project affected persons for any graveyards to be damaged on how best to handle the situation.	RAP Consultant	Cost for interaction with project affected persons Part of RAP consultant's budget	Minutes of meetings	Once after RAP activities	KCCA	
	Any historic built environment	Contractor	Cost for	Repaired or	Monthly by		

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	affected by the project activities will be repaired or rebuilt.		compensation Part of RAP costs	rebuilt built environment	KCCA/Supervising Consultant	KCCA/Supervising Consultant	
Interruption/ Disturbances to intangible heritage resources	Maintaining understanding of and respect for cultural norms (religion, social organisation, rituals, forms of cultural expression, traditional techniques and activities).	Project Affected Persons (Relocation victims)		Knowledge of cultural norms among the young of those displaced	annually during operation (liability period) for 3 years	Ministry of Tourism and Antiquities (Department of museums and monuments)	- DMRB Volume 10, Section 6 Part 2: cultural heritage asset management plans - DMRB Volume 11,Section 2, Part 3: Cultural Heritage
	Instituting mechanisms to ensure community cohesion to preserve their cultural heritage during construction and post construction phases	RAP consultant	Part of RAP costs	Mechanisms in place	Once after RAP activities	KCCA	
Biophysical							

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
impacts							
Positive impacts							
Increase in fauna (bird) species diversity	Live in harmony with birds seen in the construction areas by not injuring them in any way.	Contractor	-	Bird kills	Monthly during construction	KCCA/Consultant	
Negative impacts							
Loss of plant species and degradation of habitats	Delineate areas to be cleared of vegetation.	Contractor	Cost of delineation of areas to be cleared Part of contractor's budget	Markings of area to be cleared	Before vegetation clearance	Contractor's EHS Officer	
	Manual vegetation clearance where possible to avoid indiscriminate clearance.	Contractor	Cost for manual vegetation clearance	Still standing species of conservation	Daily during site clearance by contractor	Contractor's EHS Officer Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Part of contractor's budget		Monthly during site clearance by Consultant	environmentalist	
	Design new road lanes on road sides without the species of conservation concern where possible	Design Consultant	Cost for design Part of design consultant's budget	Still standing species of conservation Designs that avoid species of conservation concern	Daily during site clearance by contractor Monthly during site clearance by Consultant Once before approval of designs	Contractor's EHS Officer Consultant environmentalist KCCA	
	If NFA reserved species have to be cleared, seek permission	Developer (KCCA) and	Cost for permit for	Permit to clear NFA reserved	Once before site clearance.	Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	to clear them from the responsible authorities and replant them by the road/ junction sides	contractor	clearance and replanting of NFA reserved species Replanting costs are Part of contractor's budget	species.		Environmentalist	
	Sensitize workers about the need to minimize damage on plant species	Contractor	Costs for sensitization Part of contractor's budget	Vigorously growing species of conservation concern	Twice after site clearance	Supervising Consultant Environmentalist	
	Place new road lanes on the side of the roads that have no wetland/stream or on wetland sides that are more degraded with human activity such growing of crops, trees, and	Design consultant	Cost for design of roads Part of design consultant's budget	Minutes of sensitization meetings	Once just before site clearance Once before approval of	Supervising Consultant Environmentalist KCCA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	waste disposal				road designs		
	All persons losing crops and trees will be adequately compensated.	KCCA	Cost for compensation for lost crops and trees Part of RAP costs	Comments from Project Affected Persons losing crops and trees	Before commencement of construction activities	- KCCA - MoLHUD	
	Tree clearance will be compensated by tree planting where space provides an opportunity.	Contractor	Cost for replanting of trees	Trees replanted in available space	Once after construction	- KCCA - Supervising consultant	See Volume 10 Section 3 Part 1
	Avoid spilling of bitumen that would damage vegetation	Contractor	-	Spills of bitumen	Daily during construction	Contractor's EHS officer	
	Avoid creation of new diversion roads by using existing roads as diversions where possible.	Contractor	-	Newly created diversion roads	Daily during construction	Contractor's EHS officer	
	Fit Stone crushing plants with dust control devices and	Contractor	Cost for dust control	Dust control devices on	Once before stone	Contractor's EHS officer	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	operate them in accordance with manufacturer's specifications.		devices Part of contractor's budget	stone crushing plants	crushing operations		
	Avoid conservation areas e.g. forests and wetlands for placement of Workshop facilities, equipment storage facilities and workers camps	Contractor	-	Ancillary facilities placed outside conservation areas	Once after selection of ancillary facilities' locations	Contractor's EHS officer Consultant environmentalist	
	Select areas which will minimize vegetation loss access routes, construction workshops, equipment and materials' storage sites and workers' camps	Contractor	-	Ancillary facilities placed outside heavily vegetated areas	Once after selection of ancillary facilities' locations	Contractor's EHS officer Consultant environmentalist	
	Do not place stockpiles of earth on vegetation, particularly young plants which have been planted deliberately.	Contractor		Stockpiles not placed on Vegetation	Daily during construction by contractor Monthly	Contractor's EHS Officer	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					during construction by consultant environmentalist		
	Re-vegetate all areas cleared of grass just after decommissioning.	Contractor	Costs for re-vegetation of cleared unpaved areas Part of contractor's budget	Cleared areas revegetated	Once after decommissioning	KCCA/ Consultant environmentalist	
Proliferation of invasive species of plants	Thoroughly clean construction equipment brought in from outside the project area to minimize the risk of introducing invasive species from outside the project area.	Contractor	Cost for cleaning equipment before use Part of contractor's budget	Clean construction equipment	Once just before equipment are brought to the construction sites	Contractor's EHS Officer	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	All equipment will be cleaned well before demobilization out of the project area.	Contractor	Cost for cleaning equipment before demobilization Part of contractor's budget	Clean equipment	Once just before equipment are demobilised	Contractor's EHS Officer	
	Enhance awareness of the workers and neighbouring communities about the dangers and threats invasive species can potentially pose to ecosystem stability.	Contractor	Cost for sensitization Part of contractor's budget	Minutes/ record of sensitization	Once before construction, once during construction and once during operation	KCCA/consultant	
	Restore the non-paved disturbed areas immediately after construction with indigenous vegetation	Contractor	Cost of revegetation Part of contractor's	Vigorously growing planted indigenous species	Once after construction	KCCA/consultant environmentalist	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget				
	During channelization endeavour to maintain the flow direction of water within wetlands.	Design consultant and Contractor	Cost of design and culverts Part of design consultant and contractor's budgets	Dead/ wilted wetland plants	Daily during construction in wetlands by contractor Monthly during construction by Contractor	Contractor's EHS Officer	
	Obtain all borrow material if possible from quarry or borrow pits within the project area.	Contractor	-	Borrow material obtained from within the project area	Monthly during construction	KCCA/ consultant	
	Import Earth for filling during road construction from bare/almost bare ground.	Contractor	Cost for vegetation clearance from extraction of	Earth imported from bare/almost bare ground.	Daily during extraction of materials	Contractor's EHS Officer	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			materials Part of contractor's budget				
	Immediately after construction, road edges cleared of vegetation will be planted with species indigenous to those areas and their regrowth monitored until they are mature	Contractor	Cost for revegetation Part of contractor's budget	Vigorously growing planted indigenous species	Twice after construction	KCCA/ Consultant environmentalist	
	Monitor growth of invasive species of plants within the proximity to the roads and mechanically remove any that may grow in the area, preferably before they begin flowering/fruiting stage	Contractor	Cost for removing invasive species Part of contractor's budget	Presence of new or additional invasive species	Every 4 months during operation	KCCA	
Displacement of fauna	Minimize cutting down of big trees and draining of wetlands	Contractor	Cost for minimizing	No unnecessary cutting of big	Daily by Contractor	Contractor KCCA/Superv	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
species and reduction in number of fauna species	outside the road alignment which are main habitats for biodiversity		vegetation clearance. Part of contractor's budget	trees and draining of wetlands	Monthly by KCCA/Supervising consultant during construction	ising consultant	
	Sentitive areas like woodlots and wetlands and major thickets will be avoided	Design consultant	Cost for design that avoids woodlots and wetlands Part of design consultant's budget	Design that avoids wetlands and woodlots Woodlots and wetlands still in pace	Once before approval of road designs Daily by Contractor Monthly by KCCA/Supervising consultant during construction	KCCA Contractor KCCA/Supervising consultant	
	Development of a fauna habitat replacement plan where	Contractor	Cost for development	A fauna habitat replacement	Just before construction	Contractor KCCA/Superv	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	the habitat cannot be avoided		of a fauna habitat replacement plan Part of contractor's cost	plan in place		ising consultant	
	Leaving a section of fauna habitat to service the remaining ecosystem where the habitat has to be cleared.	Contractor	-	Sections of fauna habitats in place	Daily by Contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	
	Monitor recovery of Fauna habitat areas (woodlots and wetlands) if affected during construction	Consultant	Cost for monitoring Part of supervising	Well recovered fauna habitats	Monthly by KCCA/Supervising consultant	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			consultant's budget		during construction		
	Any roosting or breeding sites encountered during construction will be avoided or evacuated by specialised experts if possible.	Contractor	Cost for evacuation of roosting or breeding sites Part of contractor's budget	Roosting or breeding sites still in place	Daily by Contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	
	Minimise project time to ensure quick recovery and re-colonization of the sites.	-Contractor -KCCA	-	Project time lines observed	Monthly during construction	KCCA/Supervising consultant	
	Deliberate planting of trees and grass along certain road side areas	-Contractor -Design consultant	Cost for planting of trees and grasses along the roads Part of	Revegetation along roads	Twice during operation	KCCA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Contractor and design consultant's budgets				
	Minimise construction noise by implementing measures proposed to mitigate the impact of increase in noise levels	Contractor	Cost for minimizing noise Part of Contractor's budget	Evidence of implementation of measures to mitigate increase in noise levels	Daily by Contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	
Displacement of soil/earth material and cliff formation at borrow sources	Cuts on quarries will not exceed the angle of repose which could lead to rock falls, slips and land slides	Contractor		Cuts on quarries not exceeding the angle of repose	Daily by Contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	If not to continue in operation, all used quarries and borrow pits will be reinstated by backfilling with spoil material from the road cuts and then top soil initially removed from the quarry and borrow pit areas	Contractor/Supplier	Cost for reinstatement of quarries and borrow pits Part of contractor's /Supplier's budget	Absence of pits/gaping holes	Once after reinstatement	KCCA/supervising consultant	
	Exposed slopes will be protected using conventional civil engineering structures (such as stone filled meshed fences) in conjunction with bio-engineering techniques	Contractor	Cost for the civil engineering structures Part of contractor's budget	Protected exposed slopes with recommended techniques	Once after reinstatement	KCCA/supervising consultant	
Change in geological substructure	Activities that would result into a change in the geological structure will be limited to only	Contractor		Excavation not beyond areas under operation	Daily by contractor and monthly	Contractor KCCA/ Supervising	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	the areas under operation				by KCCA/Supervising consultant	Consultant	
	Cuts will not exceed the angle of repose which could lead to rock falls, slips and land slides	Contractor		Cuts on quarries not exceeding the angle of repose	Daily by Contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	
	Stock piles for each type of material excavated will be separated. This will be done to ensure systematic backfilling of created pits and to maintain a geologic arrangement close to the original	Contractor	Part of contractor's cost	Separate stock piles for each type of material excavated.	Weekly by Contractor and monthly by KCCA/Supervising consultant during	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					construction		
	Exposed slopes will be protected using conventional civil engineering structures (such as stone filled meshed fences) in conjunction with bio-engineering techniques	Contractor	Cost for the civil engineering structures Part of contractor's budget	Protected exposed slopes with recommended techniques	Once after reinstatement	KCCA/supervising consultant	
	Newly eroded channels will be backfilled and restored to natural contours	Contractor	Cost for back filling channels Part of contractor's budget	Back filled channels	Weekly by Contractor and monthly by KCCA/Supervising consultant during	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					construction		
	Areas susceptible to erosion will be protected using ether temporary or permanent drainage works	Contractor	Cost for drainage works Part of contractor's budget	Areas susceptible to erosion protected	Weekly by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	Scouring of slopes will be prevented	Contractor	Cost for installation of measures to prevent scouring of slopes Part of contractor's budget	No scouring of slopes	Weekly by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Ponding will be prevented	Contractor	Cost for preventing of ponding Part of contractor's budget	No ponding	Weekly by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	If not to continue in use, all borrow pits and quarry sites will be backfilled to as near as possible their original topography	Contractor/Supplier	Cost for reinstatement of quarries and borrow pits Part of contractor's /Supplier's budget	Absence of pits/gaping holes	Once after reinstatement	KCCA/supervising consultant	
	Grouting will be undertaken since it can improve the	Contractor	Cost for grouting	Grouted slopes	Weekly by Contractor	Contractor KCCA/	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	stability of unstable slopes		Part of contractor's budget		and monthly by KCCA/Supervising consultant during construction	Supervising Consultant	
Soil pollution	All waste lubricants and oils will be collected and recycled or disposed of offsite to approved sites of disposal.	Contractor	Cost for waste management Part of Contractor's budget	Oils spills on soil	Daily by contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	Central locations for refueling of vehicles and fuel powered machinery will provided	Contractor	-	Presence of central locations for refueling. Fuel spills on	Daily by Contractor Monthly by KCCA/Supervising	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
				soils	consultant during construction		
	The floors of refueling points will be impervious on a level ground and bunded/lined constructed of concrete, asphalt, chemically compatible polymer material or any other impervious surface that will contain gas, oil or any other fluids in use.	Contractor	Cost for bunding Part of Contractor's budget	Presence of bunds on floors of refueling points	Once before construction	KCCA/ Supervising Consultant	
	Hazardous material including bitumen will be stored in bunded area with a solid impermeable floor (to aid any clean should leaks or spills occur).	Contractor	Cost for bunding Part of Contractor's budget	Hazardous material stored in a bunded area Hazardous material spills on soil	Daily by contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Contaminated runoff from oil storage areas will be drained/led into ditches and ponds with oil traps (interceptors).	Contractor	Cost for interceptors Part of Contractor's budget	Presence of interceptors	Daily by contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	Spilling of surfacing materials such as bitumen will be avoided. During transportation, bitumen will be well packed to avoid any spillages	Contractor		Bitumen spills on soil	Daily by contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	Bitumen will not be applied on the road surfaces during strong winds, or heavy rains	Contractor		Bitumen spills on soil	Daily by contractor Monthly by KCCA/Supe	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					rvising consultant during construction		
	Side drains will be lined	Contractor	Cost for lining side drains Part of Contractor's budget	Lined side drains	Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	Unused bitumen will be collected for future use	Cost for packaging unused bitumen	Part of Contractor's budget Contractor	Well packaged unused bitumen	After surfacing is completed	Contractor KCCA/ Supervising Consultant	
	Biological dispersants or landfill techniques will be used to break down used oils	Contractor	Cost for use of oil break down techniques Part of	Broken down oils	Daily by Contractor during construction	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Contractor's budget				
	Contractors will use bitumen emulsion where feasible. In hilly areas with steep road gradient, cut-back bitumen will be used	Contractor	Cost for bitumen emulsion and cut-back bitumen Part of Contractor's budget	Bitumen emulsion used where feasible and cut-back bitumen used in steep areas of the roads	Daily by Contractor and monthly by supervising consultant during construction	Contractor Supervising consultant	
	Bitumen will not be discharged into side drains	Contractor		Bitumen spills in side drains	Daily by Contractor during construction	Contractor	
	Bitumen drums will be stored in designated locations and not scattered along the road.	Contractor	Cost for storage of bitumen drums Part of Contractor's	Bitumen drums stored in designated locations	Daily by Contractor and monthly by KCCA/Supervising	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget		consultant during construction		
	The use of chemicals, herbicides etc. to clear vegetation will be forbidden due to the heavy pollution they cause to the soils	Contractor		Manual clearance of vegetation No evidence of use of chemicals or herbicides	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor	
	Regular servicing and maintenance of vehicles and construction machinery that are likely to spill fuel and oils if ill-serviced will be undertaken	Contractor	Cost for servicing vehicles and machinery Part of Contractor's budget	Fuel spills on soils	Daily by Contractor Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Permits/approvals for fuel storage and transportation will be acquired from the responsible authorities	Cost for fuel storage permit Part of Contractor's budget Contractor		Permit for fuel storage and transportation	Once before construction	KCCA/Supervising consultant Petroleum Supply Department	
	An oil spill prevention and counter measure Plan will be developed and followed.	Contractor	Cost for development of an oil spill prevention and counter measure Plan Part of contractor's budget	An oil spill prevention and counter measure Plan in place	Once before construction	KCCA/Supervising consultant	
	A proper waste management Plan will be developed and followed	Contractor	Cost for development of a waste management	A proper waste management Plan in place	Once before construction	KCCA/Supervising consultant NEMA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			plan Part of contractor's budget				
Soil erosion and sedimentation (siltation)	Minimisation of earth works such as excavation, cut and fill, vegetation clearance, and compaction, to only the area that is absolutely necessary	Contractor		No unnecessary earth works	Daily by contractor and monthly by supervising consultant during construction	Contractor Supervising consultant	
	Construction cutoff ditches around stockpiles to prevent materials being washed away by surface runoff	Contractor	Cost for construction of cutoff ditches around stockpiles Part of contractor's budget	Presence of cutoff ditches around stockpiles	Weekly by Contractor and monthly by supervising consultant during construction	Contractor Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Excavated and stockpiled materials will be covered with fabric or other materials	Contractor	Cost for covering stockpiled materials Part of contractor's budget	Covered excavated materials	Daily by Contractor and Monthly by supervising consultant during construction	Contractor Supervising consultant	
	Stock piling near waterways or on slopes will be avoided	Contractor		Stock piles away from water ways or slopes	Weekly by Contractor and Monthly by supervising consultant during construction	Contractor Supervising consultant	
	Use of existing roads as access roads to quarry sites, borrow areas, workers camps, and	Contractor		No newly created access roads	Monthly by supervising consultant	Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	workshops where possible				during construction		
	Revegetation of any constructed access roads during the decommissioning phase of the project	Contractor	Cost for revegetation Part of contractor's budget	Revegetated access roads	Twice after decommissioning	KCCA/Supervising consultant	
	Location of stone crushing plants away from water courses	Contractor		Stone crushing plants located away from water sources	Daily by contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	
	Stone crushing plants will be fitted with approved dust controls and operated in	Contractor	Cost for installation of dust control	Dust controls on stone crushing plants	Daily by contractor and monthly	Contractor KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	accordance with manufacturer's specifications		measures on stone crushing plants Part of contractor's budget		by KCCA/Supervising consultant during construction		
	Soil erosion checks will be put in place where ever necessary along drains. These checks will include scour checks, silt traps, paving of drains, and stone pitching. In addition, drains will be regularly desilted.	Contractor	Cost for soil erosion checks Part of contractor's budget	Soil erosion checks in place Clean drains	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	
	Construction of interception ditches, and settling ponds to prevent muddy water reaching water sources	Contractor	Cost for construction of interception ditches and settling ponds Part of	Interception ditches and settling ponds in pace	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			contractor's budget				
	Water supply sources will be identified and relocated before site clearing and construction.	Contractor	Cost for identification and relocation of water sources Part of contractor's budget	Relocated water sources	Once by KCCA/ supervising consultant just before construction	KCCA/Supervising consultant	
	Excavation and grading activities will be planned during the dry season where possible	Contractor		excavation and grading activities time schedules	Once by KCCA/ supervising consultant just before construction	KCCA/Supervising consultant	
	After construction, vegetation will be planted in areas where vegetation was removed including areas where soil spoil	Contractor	Cost for revegetation Part of contractor's	Revegetated areas	Twice by KCCA/Supervising consultant at	KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	was previously dumped.		budget		end of construction		
	Channelisation will be done in such a way that water continues to flow in a direction as near as possible to its original.	Contractor		Absence of dried up plants due to water deprivation	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	
	Rock boulders will be placed as the first layer at the bed of swamps when filling swamps to allow continued water flow.	Contractor	Cost for rock boulders Part of contractor's budget	Absence of dried up plants due to water deprivation	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	
	Undertaking works in sloppy areas (catchment areas) will be avoided. However if they must be undertaken there then drainage systems (outfall drains) will be installed to make	Contractor	Cost for outfall drains Part of contractor's budget	Outfall drains in place	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	sure water from the catchment areas maintains its original flow direction/to make sure that water from catchment areas ends up in its usual basins.						
	Where banks of streams going through the wetlands are erodible, gabions and other measures to minimize erosion will be put in place	Contractor	Cost for gabions and erosion control measures Part of contractor's budget	Soil erosion measures in place	Weekly by Contractor and Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	
	Culverts and drainage channels will be constructed/installed taking the peak water levels of streams and swamps into consideration.	Design consultant Contractor	Cost for design and installation of culverts Part of design consultant and	Adequate culverts and drainage channels	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Contractor's budgets				
	Culverts will be leveled appropriately so that they are self-cleaning.	Design consultant Contractor	Cost for design and installation of culverts Part of design consultant and Contractor's budgets	Appropriate levels of culverts	Monthly by KCCA/ supervising consultant during construction	KCCA/Supervising consultant	
	De-silting of road drainage systems will be undertaken regularly.	Maintenance contractor	Cost for desilting road drainage systems Part of maintenance contractor's budget	Clean drainage channels	Monthly by KCCA and quarterly by MoWT during construction	KCCA MoWT	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Environmental Impact Assessments (EIAs) by registered practitioners for excavation of material from borrow pits, quarry sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants will be conducted before the excavation of material from borrow pits, quarry sites and before the construction of workshops, workers' camps, equipment storage sites etc.	Contractor	Cost for Environmental Impact Assessment for excavation of material from borrow pits, quarry sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants Part of contractor's	EIA conducted for excavation of material from borrow pits, quarry sites and construction of workshops, workers' camps, equipment storage sites, stone crushing plants	Once before material excavation and construction of the mentioned facilities	KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget				
Water pollution	All waste lubricants and oils will be collected and recycled or disposed of offsite to approved sites of disposal.	Contractor	Cost for waste management Part of Contractor's budget	Oils spills in water	Daily by contractor Quarterly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising Consultant	
	Floors of workshops, bitumen and asphalt storage plants and refueling points for all haulage vehicles and construction machinery will be bunded (lined with concrete) to avoid percolation of spilled oils and fuels into ground water or runoff of spilled oils and fuels into surrounding surface water.	Contractor	Cost for bunding Part of Contractor's budget	Presence of bunds on floors of workshops, bitumen and asphalt storage plants, refueling points Change in water quality	Once before construction for bunds and quarterly for water quality checks during construction	KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	The contractor will provide sufficient sanitary facilities for the work force	Contractor	Cost for sanitary facilities Part of contractor's budget	Presence of clean and in good condition sanitary facilities for workers No increase in feacal coliform levels in water samples	Monthly by KCCA/ supervising consultant during construction Quarterly for assessment of water quality	KCCA/Supervising consultant	
	Hazardous material including bitumen will be stored in bunded area with a solid impermeable floor (to aid any clean should leaks or spills occur).	Contractor	Cost for bunding Part of contractor's budget	Hazardous material in a bunded area Hazardous material spills in water	Daily by contractor and quarterly consultant/KCCA	Contractor KCCA/Consultant	
	Contaminated runoff from fuel and bitumen storage areas will be drained/led into ditches and	Contractor	Cost for interceptors Part of	Presence of interceptors	Daily by contractor Monthly by	Contractor KCCA/ Supervising	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	ponds with oil traps (interceptors).		contractor's budget		KCCA/Supervising consultant during construction	Consultant	
	During transportation, bitumen will be well packed to avoid any spillages	Contractor		Bitumen spills in water	Quarterly by KCCA/Supervising consultant during construction	KCCA/Supervising consultant	
	Bitumen will not be applied on the roads during strong winds, or heavy rains	Contractor		Bitumen spills in water	Quarterly by KCCA/Supervising consultant during construction	KCCA/Supervising consultant	
	Unused bitumen will be collected for future use	Contractor	Cost for storage of unused	Well packaged unused bitumen	After surfacing is completed	Contractor KCCA/ Supervising	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			bitumen Part of contractor's budget			Consultant	
	Use of biological dispersants or landfill techniques to break down used oil	Contractor	Cost for oil break down techniques Part of contractor's budget	Broken down oils	Daily by Contractor during construction	Contractor	
	Contractors will use bitumen emulsion where feasible. In hilly areas with steep road gradient, cut-back bitumen will be used.	Contractor	Cost for bitumen emulsion and cut-back bitumen Part of Contractor's budget	Bitumen emulsion used where feasible and cut-back bitumen used in steep areas of the roads	Daily by Contractor and monthly for supervising consultant during construction	Contractor Supervising consultant	
	Bitumen will not be discharged	Contractor		Bitumen spills	Daily by	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	into side drains			in side drains	Contractor during construction		
	Bitumen drums will be stored in designated locations and not scattered along the road.	Contractor	Cost for storage of bitumen drums Part of Contractor's budget	Bitumen drums stored in designated locations	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor	
	Regular servicing of vehicles and generators and other fuel utilizing machinery will prevent fuel leakages	Contractor	Cost for servicing vehicles and machinery Part of Contractor's budget	Fuel spills in water	Quarterly by KCCA/Supervising consultant during construction	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Use of chemicals, and herbicides for clearance of vegetation will be avoided. Mechanical or/and manual methods will be employed for vegetation clearance.	Contractor		Manual clearance of vegetation No evidence of use of chemicals or herbicides	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor	
	An oil spill prevention and counter measure Plan will be developed and followed.	Contractor	Cost for development of an oil spill prevention and counter measure Plan Part of Contractor's budget	An oil spill prevention and counter measure Plan in place	Once before construction	KCCA/Supervising consultant Petroleum Supply Department	
	Facilities for collection and the	Contractor	Cost for waste	Facilities for	Daily by	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	safe disposal of litter will be provided at all work force sites		management Part of Contractor's budget	collection and the safe disposal of litter in place	Contractor and monthly by KCCA/Supervising consultant during construction		
	All road construction crews will be under strict instruction to dispose of both solid and liquid wastes into only the designated facilities.	-Contractor -Supervising consultant	Cost for supervision of contractor's waste management Part of contractor's budget and supervising consultant's budget	Waste disposed of in only designated areas	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Routine inspections aimed at assessing the effectiveness of waste management systems will be undertaken by the contractor's site engineer and the resident engineer, reporting to the environmental unit in KCCA	-Contractor -Supervising consultant	Cost for supervision of contractor's waste management Part of contractor's budget and supervising consultant's budget	Efficiency of Waste management systems	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising consultant	
	Development and implementation of a waste management plan	Contractor	Cost for development of a waste management plan Part of contractor's budget	A practiced waste management plan	Daily by Contractor and monthly by KCCA/Supervising consultant during	Contractor KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
					construction		
	All issues related to waste disposal will be implemented following the regulations stipulated in the National Environment (Waste Management) Regulations 1999	Contractor	Cost for waste management as per legislation Part of contractor's budget	Waste management in accordance with regulation	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising consultant	
	Fuelling points and bitumen and asphalt storage sites will not be located near surface water	Contractor		Fuelling points and bitumen and asphalt storage sites away from surface water.	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising consultant	
	In case, community water	Contractor	Cost for	Alternative	Monthly by	KCCA/	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	sources are polluted, alternative community wells/springs will be constructed and maintained throughout the construction phase.		replacement of polluted community water sources Part of contractor's budget	water sources provided	KCCA/Supervising consultant during construction	Supervising consultant	
	Maintenance and repair of vehicles and equipment will not be done in the wetland or near water sources	Contractor		Maintenance and repair of vehicles away from wetlands and water sources	Daily by Contractor and monthly by KCCA/Supervising consultant during construction	Contractor KCCA/ Supervising consultant	
	An oil interceptor will be put in place at the work shop area so as to contain any oil spills.	Contractor	Cost for oil interceptor Part of	Presence of an oil interceptor at the workshop	Once by KCCA/ supervising	KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Contractor's budget	area	consultant		
	All spills of contaminants will be reported to Directorate of Water Resources Management as soon as the spill is noticed.	Contractor	Cost for reporting Part of Contractor's budget	Evidence of reporting oil spills in water	Monthly by KCCA/Supervising consultant during construction	KCCA/ Supervising consultant	
	The water sources if not earlier relocated that will be damaged as a result of the project activities will be rehabilitated.	Contractor	Cost for rehabilitation/ replacement of water sources Part of Contractor's budget	Compensation for damaged water sources	Monthly by KCCA/Supervising consultant during construction	KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Air pollution	To minimize dust emissions caused by movement of vehicles, unpaved roads will be sprinkled with water (using water browsers)	Contractor	Cost for sprinkling of water Part of Contractor's budget	Particulate emission levels Water browsers in use	Daily by Contractor during construction and Monthly by KCCA/Supervising consultant during construction Quarterly for assessment of particulate emission levels by KCCA/Supervising	Contractor KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Personal protective equipment such as dust masks will be availed to workers whenever needed;	Contractor	Cost for provision of PPE Part of Contractor's budget	Evidence of provision of dust masks	Monthly by KCCA/Supervising consultant during construction	KCCA/Supervising consultant	
	Regular servicing of vehicles and machinery that are likely to produce excessive gaseous emissions will be undertaken	Contractor	Cost for servicing of vehicles and machinery Part of Contractor's budget	Machinery and project vehicles in good condition	Daily by Contractor during construction	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	The speed of haulage trucks and other vehicles will be limited to 30km/hr. to reduce dust emission. To ensure this, speed humps will be put in place, sensitization of drivers about speed limits undertaken and penalties for drivers that do not heed to the speed limits enforced.	Contractor	Cost for construction of speed humps along construction routes Part of contractor's budget	Drivers abiding by speed limits Speed humps in place	Daily by Contractor during construction and Monthly by KCCA/Supervising consultant during construction	Contractor KCCA/Supervising consultant	
	All idle equipment or machinery will be turned off to minimize on gaseous emission.	Contractor		No running idle equipment	Daily by Contractor	Contractor	
Depreciation in visual scenery	Clearing of vegetation and demolition of buildings will be limited to only those areas where it is absolutely necessary.	Contractor		No unnecessary clearing of vegetation	Daily by Contractor	Contractor	
	On completion of construction works, any areas that were	Contractor	Cost for revegetation	Revegetated unpaved areas	Twice after construction	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	cleared of vegetation but are not paved will be planted with grass and trees indigenous to those areas.		Part of contractor's budget		works		
	Where the Contractor prefers to open borrow pits and quarries purposely for this proposed project, quarries and borrow pits will be restored or rehabilitated to as far as is possible their original conditions.	Contractor	Cost for rehabilitation of quarries and borrow pits Part of contractor's budget	Restored quarries and borrow pits	Twice after completion material excavation	KCCA/Supervising consultant	
	Individual Environmental Impact Assessments will be conducted by certified environmental practitioners before the excavation of material from any new borrow pits, and quarry sites.	Contractor	Cost for Environmental Impact Assessment for excavation of material from borrow pits, quarry	EIA conducted for excavation of material from borrow pits, quarry sites and construction of workshops,	Once before material excavation and construction of the mentioned facilities	Supervising consultant NEMA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants Part of contractor's budget	workers' camps, equipment storage sites, stone crushing plants			
	A waste management plan will be developed and implemented.	Contractor	Cost for development of a waste management Plan Part of contractor's	A practiced waste management plan	Daily by Contractor and monthly by KCCA/Supervising consultant	Contractor KCCA/ Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget		during construction		
	During site reinstatement, top soil removed from the project sites during site clearance will be returned and planted with grass and trees indigenous to the sites	Contractor	Cost for storage and return of top soil for reinstatement Part of contractor's budget	Top soil returned to project sites and revegetated	Twice after completion of construction works/after reinstatement	KCCA/ Supervising consultant	
Post- construction phase							
Socio-economic impacts							
Positive impacts							
Improved mobility of vehicles,	Strict supervision of the contractor to ensure that all required specifications and	- KCCA - Supervising Consultant	Costs for supervision (staff fees,	Construction as per approved Road designs	Daily for Contractor	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
reduction in travel time and reduced traffic congestion	standards for construction of a durable road are complied with.		transport and perdiem) Part of Supervising consultant's budget and KCCA annual budget	Final good quality road	Monthly for KCCA/Supervising consultant	KCCA/ Supervising Consultant	
	Installation of road signage to control against accidents related to the "new road effect"	Contractor	Costs for road signage Part of contractor's contract	Installed signage	At end of construction	KCCA/Supervising consultant	
Reduced vehicle wear and tear thus reduced	Strict supervision of the contractor to ensure that all required specifications and standards for construction of a	- KCCA - Supervising Consultant	Costs for supervision (staff fees, transport and	Construction as per approved Road designs	Daily for Contractor	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
maintenance costs	durable road are complied with.		perdiem) Part of Supervising consultant's budget and KCCA annual budget	Final good quality road	Monthly for KCCA/Supervising consultant	KCCA/ Supervising Consultant	
	Regular post construction road maintenance to avoid the breakdown of the new road infrastructure and return to the initial poor road conditions	KCCA, Wakiso District	Cost for regular maintenance of roads Part KCCA & Wakiso District's budgets	No. times the roads are maintained annually	2 years after construction and annually	KCCA, Wakiso District, Ministry of Works and Transport	
Reduction in dust levels	Strict supervision of the contractor to ensure that all	-KCCA -Supervising	Costs for supervision	Construction as per approved	Daily for Contractor	Contractor	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	required specifications and standards for construction of a durable road are complied with.	Consultant	(staff fees, transport and perdiem) Part of Supervising consultant's budget and KCCA annual budget	Road designs Final good quality road	Monthly for KCCA/Supervising consultant	KCCA/ Supervising Consultant	
	All bare surfaces opened during the construction phase will be rehabilitated by way of revegetation	Contractor	Costs for rehabilitation of opened surfaces Part of contractor's budget	All bare surfaces rehabilitated	Before commissioning	KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Routine (preferably daily) sweeping of the roads and their sides to reduce on any dust that may accumulate as a result of day to activities of people operating along the different roads.	KCCA	Costs for cleaning the city Part of KCCA budget	No of times roads are swept weekly.	Weekly	KCCA	
	Enforce speed limits	Traffic Police	Traffic enforcement costs Part of Traffic Police budget	Traffic officers assigned on the roads	Daily	Traffic Police	
Improved access to health services	Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with.	-KCCA -Supervising Consultant	Costs for supervision (staff fees, transport and perdiem)	Construction as per approved Road designs Final good quality road	Daily for Contractor Monthly for KCCA/Supe	Contractor KCCA/ Supervising	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Part of Supervising consultant's budget and KCCA annual budget		rvising consultant	Consultant	
	Availability of drugs in the health facilities.	-Ministry of Health	Costs for drugs Part of Ministry of Health's budget	Availability of drugs in health facilities	Bimonthly during operation	Ministry of Health	
	Adequate medical personnel to help save the lives of people.	-Ministry of Health	Costs for medical personnel Part of Ministry of	Ratio of doctors to patients	Annual	Ministry of Health	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			Health's budget				
Increase in value of land and property along the roads	None						
Land development and more business opportunities	None						
Improved sanitation and a reduction in related diseases	KCCA will provide dumping bins in designated places for people to dump in their rubbish. These bins will be emptied on a regular basis.	KCCA	Costs for dumping bins Part of KCCA's annual budgets	Number of dumping bins per road	Continuously throughout the operation phase	KCCA NEMA	
	Private garbage collectors will	KCCA	Costs for			KCCA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	be contracted to collect rubbish along the roads on a regular basis.		private garbage collectors Part of KCCA's annual budgets	Number of contracted private garbage collectors	Biannual	NEMA	
	Sensitisation campaigns towards change in sanitation practices and proper sanitation will be engineered by KCCA in Kampala in general and along the roads.	KCCA	Costs for sensitization campaigns Part of KCCA's annual budgets	Number of sensitization campaigns carried out	Biannual	KCCA NEMA	
	Byelaws against littering of rubbish will be developed and disseminated to the people. These will include fines by	KCCA	Costs for drafting of byelaws	Bye-laws in place and implemented	Biannual	KCCA NEMA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	whoever breaks them.		Part of KCCA's annual budgets				
Street lighting	Continuous community awareness with regard to community policing to safeguard the street lights.	KCCA	Costs for yearly community sensitization meetings Part of KCCA's annual budgets	No of awareness campaigns per year through radio, television and community meetings etc. Anti-theft measures	At the beginning of the operation phase and quarterly throughout the operation phase	NEMA KCCA	
	The lights will be designed in a way that will be difficult for the thieves to take.	Design consultant	Costs for consultant's design to be paid off by KCCA Part of design	Anti-theft measures	At the beginning of the operation phase	NEMA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			consultant's budget				
Improved Scenic Beauty/Aesthetics	Daily sweeping of the roads as is done on other roads.	KCCA	Costs for labour Part of KCCA annual budgets	Number of times the roads are swept	Daily during operation	KCCA Communities along the roads Road users NEMA	
	Routine garbage collection by KCCA	KCCA	Costs for garbage collection Part of KCCA annual budgets	Number of times garbage is collected per road	Weekly during operation	KCCA Communities along the roads Road users NEMA	
	Enforce fines to whoever will be found littering garbage	KCCA	Costs for monitoring	Number of		KCCA Communities	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	anyhow.		Part of KCCA annual budgets	cases of littering	Monthly during operation	along the roads Road users NEMA	
	Periodic desilting of drainage channels	KCCA	Costs for labour Part of KCCA annual budgets	Number of times the drainages are desilted	Bi-annually during operation	KCCA Communities along the roads Road users NEMA	
	Periodic maintenance of the roads and street and junction lights	KCCA	Costs for maintenance Part of KCCA annual budgets	Number of working lights	Monthly during operation	KCCA Communities along the roads Road users NEMA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Tourism attraction	Promote archaeo- tourism related activities	Ministry of Tourism, Wildlife and antiquities	Costs for adverts of tourist attractions in Kampala and Uganda as a whole Costs part of ministry budget	Number of adverts on archaeo-tourism related activities in Uganda	Monthly during operation	Ministry of Tourism, Wildlife and Antiquities	
	Strict supervision of the contractor to ensure that all required specifications and standards for construction of a durable road are complied with	Supervising consultant KCCA	Costs for supervision (staff fees, transport and perdiem) Part of Supervising consultant's	Construction as per approved Road designs Final good quality road	Daily for Contractor Monthly for KCCA/ Supervising Consultant	Contractor KCCA/ Supervising Consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget and KCCA annual budget				
	Preserve local cultural traditions	Contractor	None	Local cultural traditions preserved	Daily by contractor Monthly by KCCA/ Supervising Consultant	Contractor KCCA/ Supervising Consultant	
Negative impacts							
Loss of jobs	Counselling programs for the workers before completion of the construction.	RAP consultant Contractor	Cost for counselling Part of supervising consultant's budget and Contractor's	Evidence of counselling of workers	Twice just before end of construction	KCCA/ Supervising consultant MoGLSD	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
			budget				
	Financial literacy and management trainings may be carried out for the workers to ensure proper and prudent use and investment of their salaries to ensure continued earning even after completion of construction.	-RAP -Consultant -Contractor	Costs for financial literacy and management trainings Part of supervising consultant's budget and Contractor's budget	Evidence of Financial literacy and management trainings undertaken by workers	Twice just before end of construction	KCCA/ Supervising consultant MoGLSD	
Permanent Blocking of access to homes and other public places	Ensure that after construction, there are alternative accesses to the blocked homes	Contractor	Cost for alternative accesses Part of contractor's budget	Alternative accesses to blocked homes in place	Once at end of construction	KCCA/Supervising consultant	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Round culverts will be adopted for drainage in the sections were there is a home or business premise in close proximity to the road.	-Drainage Design consultant -Contractor	Cost for design and construction of culverts Part of drainage design consultant's budget and contractor's budget	Round culverts used for road areas close to homes	Monthly during construction	KCCA/Supervising consultant	
Increase in traffic on some roads	Proper signalization of the proposed junctions like Kabuusu junction and effective use of the traffic lights will help to reduce the anticipated traffic along the affected roads.	Contractor	-				
Risk of accidents due to over	Proposed speed limits per road will be maintained.	Road users	-	Number of accidents	Continuous during operation	KCCA Traffic Police	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
speeding							
	Wherever feasible, humps will be installed to regulate speed	-Design consultant -Contractor	Cost for design and construction of humps Part of design consultant's budget and contractor's budget	Speed humps in place	Monthly during construction	KCCA/Supervising consultant	
	Road safety campaigns especially among pupils/students will be undertaken by the schools' administrations. Introduction of road safety education curriculum in schools especially primary and secondary levels.	School administrators	Cost for road safety campaigns Part of school budgets	Evidence of road safety campaigns undertaken	Quarterly in the first year of operation	KCCA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	Where feasible especially near schools, zebra crossings will be provided for.	-Design consultant -Contractor	Cost for design and installation of Zebra crossings Part of design consultant's budget and contractor's budget	Zebra crossings in place	Monthly during construction	KCCA/Supervising consultant	
	Road safety campaigns in general for road users through radio talk shows.	Uganda Police, traffic department	Cost for road safety campaigns Part of Police's budget	Evidence of road safety campaigns undertaken	Quarterly in the first year of operation	KCCA	
	Placement of traffic officers along areas that may	Uganda Police, traffic	Part of Police's	Traffic police present at areas	Weekly during	KCCA	

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
	considered most at risk e.g. at junctions.	department	budget	that are considered at risk	operation		
	Constant performance monitoring of the roads to identify any black spots that could lead to accidents.	KCCA	Cost for performance monitoring of road. Part of KCCA's operation and maintenance budget	Monitoring reports	Once a year during operation	KCCA	
Biophysical impacts							
Positive impacts							
-							
Negative impacts							
-							

Potential Impact	Mitigation/enhancement measure	Responsibility for mitigation/enhancement	Estimated cost (Mitigation)	Monitoring indicators	Frequency of monitoring	Responsibility for monitoring	Reference to MoWT Manual 2010
Cumulative impacts							
Increased exposure to noise, increased disruption of traffic, increased loss of plant species and degradation of habitats, increased air pollution	The mitigation measures for the independent project impacts presented in this table will be implemented	As presented for the independent project impacts presented in this table	Cost for implementation of mitigation measures for the independent project impacts presented in this table	Monitoring Indicators for the independent project impacts presented in this table	As presented for the independent project impacts presented in this table	As presented for the independent project impacts presented in this table	

Environmental and social monitoring costs

The estimated environmental and social monitoring costs are presented in Table 61 below.

Table 59: Esstimated Environmental and Social Monitoring Costs

Construction phase (2 years)			
Item	**Unit (days)**	**Unit cost (USD)**	**Total cost (USD**
A) Fees			
KCCA (Consultant EMS)	127	440	55880
KCCA (Consultant Sociologist)	123	440	54120
KCCA (Consultant engineer)	120	440	52800
Sub total			**162800**
B) Day allowance			
Item	**Unit (days)**	**Unit cost (USD)**	**Total cost (USD)**
KCCA (Consultant EMS)	96	120	11520
KCCA (Consultant Sociologist)	480	120	57600
KCCA (Consultant engineer)	120	120	14400
MoLHUD Officers (2)	6	80	480
MoGLSD Officers (2)	36	80	2880
MoWT Officers (2)	36	80	2880
Utility service provider officers (3)	9	80	720
Petroleum Supply Department Officer (1)	3	80	240
Dept. of Museums and Monuments officers (2)	6	80	480
NWSC Officers (1)	72	80	5760
Sub total			**96960**
C) Reimbursibles	**No of trips/Measurements**		

Transport	27 trips	640	17280
Water quality analysis	6	1428	8568
Noise measurements	6	1700	10200
Air quality measurements	6	2571	15426
Soil chemical quality analyses	6	6000	36000
Sub total			**70194**
D) Miscellaneous			20,000
Sub total			**3000**
Liability period			
a) **Fee**s			
KCCA (Consultant EMS)	5 days	440	2200
b) Day allowance			
KCCA (Consultant EMS)	5 days	120	600
MoGLSD Officers (2)	36 days	80	2880
Dept. of Museums and Monuments officer (1)	9 days	80	720
c) Transport	10 trips	640	6400
Sub total			**12800**
GRAND TOTAL			**362,754**

Note: The table excludes contractor monitoring costs

The total cost for monitoring during the construction phase and liability period, excluding contractor monitoring costs has been estimated at **USD 362,754**

9. CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

The project will result into a number of impacts on the environment. These impacts will be both positive and negative. Most of the impacts identified would be of medium to high significance.

Although the project will result into some adverse/negative impacts, it is recommended that environmental aspects of the project are approved since these negative impacts can be mitigated or eliminated as evidenced in Chapter 7 of this report and Table 58. The developer is also committed to implementing the proposed mitigation measures. It is however recommended that the project is approved on condition that the measures and recommendations proposed under this report to mitigate/eliminate the adverse impacts are implemented during the project works. This is because the positive impacts of the project would only outweigh the negative impacts if the measures and recommendations proposed under this report to mitigate or eliminate those negative impacts are implemented.

In the event that the project is approved;

The developer is called upon to ensure that the mitigation measures proposed under this report are implemented.

The developer should also ensure that the ESMP presented under this report is available to the relevant parties responsible for implementing it.

To supplement the ESMP presented under this report, all contractors should be called upon to develop the following Environmental management plans:

- A Spill Prevention and Counter Measure plan;
- Waste Management Plan;
- Occupational Health and Safety Plan;
- HIV/AIDS Prevention Plan;
- Erosion and Sediment Control Plan;
- Environmental Restoration plan;
- Flood Control Plan
- Environmental Management Plan
- Traffic management plan and
- Utility relocation plan
- Stakeholder and Citizen Engagement (Grievance Management) Plan

Reference to the World Bank Group Environmental, Health, and Safety (EHS) Guidelines in conjuction with the recommendations stated in this report is recommended during prepararion of the above mentioned environmental management plans.

The developer should ensure that on completion of project works, all sites disturbed by the project works are restored to as near as possible their original state before the commencement of the project works as per developed and approved restoration plans.

Since impacts are site specific, individual Environmental Impact Assessments (EIAs) for excavation of material from borrow pits, quarry sites and for the construction of workshops, workers' camps, equipment storage sites, stone crushing plants and any other ancillary works e.g. creation of road diversions, extraction of water from water sources etc. should be conducted by the developer/contractors, before the commencement of works. The EIAs should be conducted by qualified and registered EIA practitioners.

The contractor should recruit an Environmentalist, a Community Liaison Officer, Health and Safety Officer, among other staff, who will monitor the implementation of the EMMP.

The contractor's environmentalist should produce and submit to the developer/Supervising consultant's Environmentalist monthly reports on how far the project conforms to the statements in the ESIA report.

The developer should keep records and make monthly and annual reports to the NEMA describing how far the project conforms to the statements in the ESIA report.

As required by the National Environment Audit Guidelines, the developer should carry out environmental audits of the project and submit the first Environmental audit report to the Executive Director, NEMA within a period of not less twelve months and not more than thirty six months after the commencement of the project. Also, environmental audits should be conducted by the developer or the contractors for the project ancillary components including borrow pits, quarry sites, workshops, workers' camps, equipment storage sites, road diversions etc. for which individual EIAs will have been carried out. The audits of the ancillary facilities should be conducted between the first year and the third year after the commencement of the project ancillary operations or after the completion of the ancillary operations or earlier if the operations will run for less than a year.

The developer should obtain any necessary permits including water abstraction permits, waste discharge permits, fuel transportation and storage permits, permits to cut down NFA reserved species, among others.

The developer or contractors should ensure that impacts not contemplated at this stage are quickly addressed in case they arise.

If the developer wishes to add any other component onto the project which was not considered under this assessment, a fresh Environmental and/or Social Impact Assessment (as an addendum) for the additional component should be undertaken to determine its compatibility with the immediate environment, its impacts on the environment and to identify appropriate mitigation measures for its adverse impacts.

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APPENDICES

Contained In Volume II of this ESIA report are the following appendices

Appendix I: Terms of reference for the ESIA of the proposed improvement of selected roads links and junctions to improve mobility in kampala city
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