Environmental and Social Impact Assessment (Part 1 – Main Report)

Engineering Design and Tender Documentation for Improvement of Priority Drainage Systems in Kampala Capital City

Date (May 2018)

To: Kampala Capital City Authority (KCCA)

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ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Description
ALARP	As Low as Reasonably Practicable
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
BLB	Buganda Land Board
CAD	Computer-Aided Design
CEMP	Construction Environmental Management Plan
CGV	Chief Government Valuer
CN	Curve Number
DEM	Digital Elevation Model
DTM	Digital Terrain Model
DWRM	Directorate of Water Resources Management
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Mananagent and Monitoring Plan
ESMF	Environmental and Social Management Framework
ESRI	Environmental Systems Research Institute
GIS	Geographical Information System
ICMP	Integrated Catchment Management Plan
KCCA	Kampala Capital City Authority
KDMP	Kampala Drainage Master Plan
KIIDP	Kampala Institutional and Infrastructure Development Project
masl	Meters above sea level
MoGLSD	Ministry of Gender Labour and Social Development
NASA	National Aeronautics and Space Administration
NEMA	National Environment Management Authority
NWSC	National Water and Sewerage Corporation
OSH	Occupational Safety and Health
O&M	Operation and Maintenance
OP	Operational Principle
PAP	Project Affected Person

PCR	Physical Cultural Resources
PIP	Project Implementation Plan
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
ROW	Right-of-Way
SMEC	Snowy Mountains Engineering Corporation
SOW	Scope of Works
SRTM	Shuttle Radar Topography Mission
TOR	Terms of Reference
UTM	Universal Transverse Mercator
WB	World Bank
WMD	Wetlands Management Department

01. Introduction

This project is aimed at improvement of priority drainage systems in Kampala Capital City, and is part of the second phase of the Kampala Institutional and Infrastructure Development Project (KIIDP), among other KCCA infrastructure development Projects. Under the KCCA Infrastructure development component, Phase 2 will seek to construct and upgrade identified roads and junctions and drainage channels that are central to enhancing mobility and reducing flooding thereby increasing the useful life of city infrastructure. These interventions by KCCA, in some instances, will be conducted in the same geographical area as some sections of the priority drainage channels in this project and therefore have a tie-in with its implementation.

Other infrastructure developments planned in Kampala Capital City include the Southern Bypass, Northern Bypass expansion, Kampala-Jinja Expressway by Uganda National Roads Authority (UNRA) and the Standard Gauge Railway. These proposed development projects interact in a number of ways with this priority drainage improvement project.

The Consultants, SMEC International Pty Ltd, Australia, (SMEC), have prepared this comprehensive Environmental Impact and Social Assessment (ESIA) for the proposed Improvement of Priority Drainage Systems in Kampala Capital City (the Project). In addition, a Resettlement Action Plan (RAP) has been prepared for the project and compiled in separate report.

This Project is categorized under the Third Schedule of the National Environment Act within Section (4) Dams, rivers and water resources as (b) river diversions and water transfer between catchments; (c) flood-control schemes. The World Bank EIA Guidelines (World Bank, 1999) categorize the proposed project as a Category B project. Both the national legislation and international guidelines therefore recommend that a full ESIA be conducted for the proposed Project prior to implementation.

02. Objectives of the ESIA

The main objective of the ESIA was to develop an Environmental and Social Mananagent and Monitoring Plan (ESMMP) to guide the emerging project design and works in consideration of the environment and social baseline conditions and issues. The ESMP was built as per assessment to understand the interaction of the Project with the social and economic environment, and hence identify potential benefits and adverse impacts of the Project. Mitigation measures to address the impacts by enhancing the positive impacts and avoiding, reducing or offsetting the adverse impacts were then developed in the ESMMP.

Specifically, the study aims to:

i) Conduct baseline environmental investigations along the Project channel routes;
ii) Conduct consultations with relevant stakeholders, including potentially affected persons, to obtain their views and suggestions regarding the environmental and social impacts of the proposed project;
iii) Propose mitigation measures to address potential negative impacts; and
iv) Prepare an Environmental and Social Management and Monitoring Plan to guide the implementation of the recommended enhancement and mitigation measures.

03. Project Justification

The drainage of Kampala is mainly through eight (08) primary channels served by numerous secondary and tertiary systems. Human settlements and industrial developments are extending from the many hills to the low lying areas on the banks of the drainage channels which are part of wetlands and floodplains. The natural and manmade drainage channels along the floodplains and low-lying areas are regularly overtopped by floodwaters, causing damage to people's homes and industrial properties, seriously disrupting traffic flow and economic activity in the City and increasing water pollution.

The frequency of flooding has increased due to increased runoff caused by land-use changes in the catchments and reduction of the buffer capacity of wetlands due to encroachment. This results in loss of lives, destruction of livelihoods, and recurring costs to Kampala's socio-economy. Investment in upgrading drainage infrastructure is required to protect people and their property and also spur economic development.

This project aims to improve three (03) of the eight (08) drainage systems in the city i.e. Lubigi (System 2), Kansanga and Gaba (System 4 and 4A), and Kinawataka (System 6) in order to resolve the problem areas along these systems such as risk of flooding, and lack of accessibility for channel maintenance.

04. Project Description and Scope

Kampala is drained by eight (08) major/primary channels, which are fed by numerous secondary, tertiary, and quaternary channels of varying capacities. The lower lying areas of the City are usually inundated in the event of heavy rains, with the residents and road users in such flooded areas suffering during the after-effects of floods.

This project will involve the improvement of three Primary drainage channels in Kampala Capital City i.e. Lubigi, Kansanga and Gaba, and Kinawataka systems. Table ES 01 shows the lengths of the primary and secondary channels that will be improved as part of this Project.

Table ES 01: Drainage Systems included in Assignment

Drainage System	Order of drain(s)	Number of Channels and Length (km)		
		No. of Channels	Primary	Secondary
System 2 - Lubigi	Primary – Upper and Lower reaches	1	2.5	
System 2 - Lubigi	Secondary	10		31.99
System 4 and 4A – Kansanga and Gaba[1]	Primary	1	7.16	
System 4 and 4A – Kansanga and Gaba	Secondary	4		8.45
System 6 - Kinawataka	Primary	1	4.42	
System 6 - Kinawataka	Secondary	4		9.3
Total Length			**14.08**	

05. Project Location

The channels to be improved in this project majorly traverse the four divisions of Kawempe, Lubaga, Makindye and Nakawa as presented in Table in Table ES 02. However, since channels in many cases

[1] System 4 and 4A – Kansanga and Gaba[1] consist of the linked Kansanga and Gabba channels whereby Gabba covers 1.78km whereas Kasanga covers 5.83km lengths

form the boundary between zones/villages, in some sections neighbouring jurisdictions such as Central Division and Kira Municipal Council in Wakiso district will also be affected.

Table ES 02: Location of channels being improved within this Project

Drainage System	Division
Primary System 2 - Lubigi	
Primary Channel	Central, Kawempe and Lubaga
Secondary 01	Lubaga
Secondary 02	Lubaga
Secondary 03, 03A & 03C	Lubaga
Secondary 04	Lubaga
Secondary 05	Lubaga
Secondary 06	Lubaga and Kawempe
Secondary 07	Kawempe
Secondary 08	Kawempe
Secondary 09	Kawempe
Secondary 10 & 10A	Kawempe
Primary System 4 - Kansanga	
Primary Channel	Makindye
Secondary 01	Makindye
Secondary 02	Makindye
Secondary 03	Makindye
Secondary 04	Makindye
Secondary 05	Makindye
Primary System 4A - Gaba	
Primary Channel	Makindye
Primary System 6 - Kinawataka	
Primary Channel	Nakawa & Kira Municipal Council
Secondary 01	Nakawa
Secondary 02	Nakawa & Kira Municipal Council
Secondary 03	Nakawa
Secondary 04 & 04A	Nakawa

06. Project Proponent and Project Cost

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P.O. Box 7010, Kampala, UGANDA
Tel.: 0414 581 294 /0204 660 000
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The Project is estimated to cost USD 93,014,897 for the entire Project. Table ES 03 shows the summary of the costs, including those for each of the drainage systems within the Project.

Table ES 03: Summary of cost for each Drainage System in the Project

Drainage System	Length of the proposed intervention area (km)	Bill No. 1 GENERAL ($)	Bill No. 2 DRAINAGE ($)	Bill No. 3 EARTH WORKS ($)	Bill No. 4 LANDSCAPING ($)	DEVELOP COSTS ($/km)	ANNUAL MAINTENANCE ($)	TOTAL ($)
Lubigi	2.5	1,122,601	37,981,888	325,217	6,698,820	1,216,936	150,162	**47,495,624**
Kansanga and Gaba	7.16	1,122,601	10,501,186	94,658	2,384,734	1,318,219	116,351	**15,537,749**
Kinawataka	4.42	1,122,601	23,730,588	130,643	2,675,545	2,093,957	228,190	**29,981,524**
TOTAL	**14.08**	**3,367,803**	**72,213,662**	**550,518**	**11,759,099**	**4,629,112**	**494,703**	**93,014,897**

Notes: According to the hydrolics assessment report, Lubiji channel streatches for about 12.10km but the planned interventions are limited to 2.5 mentioned in ES 03 above. The respective lengths for each channel hereabove specified are indicative of the extent of the channel to be improved with the proposed project works. Details of the full extent of the drainage lengths, sections in wetland systems and sections for the proposed Works are shown in Table 2-11, Table 2-12 and Table 2-13.

07. Current State of Storm Water Channels

The channels being considered for improvement in this Project in their current state were selected because of the flooding occurrences within the catchments of Lubigi, Kansanga-Gaba and Kinawataka. The major problems plaguing the three selected catchments can be summarized as:

i. Flooding

There were very many signs of flooding within the Project area as evidenced by flood marks on structures, flood prevention barriers constructed at the entrances of houses, deserted houses, and based on information obtained from community members and local leaders during stakeholder consultations.

ii. Failed culverts

Culvert structures along the length of the drainage channel vary significantly in both structural and hydraulic condition and can be classified as ranging from:

- Type A: culverts which have failed both hydraulically and structurally and should either be physically removed from the channel or totally replaced but are held in place due to the amount of vehicular traffic in place;
- Type B: culverts which have failed structurally and should either be physically removed from the channel or totally replaced; and
- Type C: culverts which have been a major source of flooding and have been physically removed from the channel.

iii. Siltation

The siltation problem within the drainage channels is a serious one, with some culverts being rendered useless as they are sometimes entirely blocked by silt build-up.

iv. Poor solid waste management

Due to the poor solid waste management culture in the City, majority of the channels were filled with domestic waste such as plastic bottles, plastic bags, clothes, shoes, and food waste. In slum areas, the storm water channels double as open sewers.

v. Lack of access for removing heaped waste and silt from cleaning channels

The poor solid waste management is exacerbated by a lack of access roads for maintenance, such that even when cleaning is done, the collected garbage and silt is piled at the edges of

the channels. This heaped mixture of garbage and silt naturally finds its way back into the channels when it rains again, resulting in a viscous cycle.

vi. **Improvised channel crossings**

Majority of the community channel crossings are improvised from wood, metal, concrete, or truck chassis, and create a health and safety risk because of their state.

08. Project Alternatives

The assessment of alternatives was based primarily on the suitability of the alternatives in the various catchments and channel locations. Factors considered during the evaluation were:

i. Technical suitability (applicability of the option to provide the desired outcome of improving storm water drainage within and around the Project area);
ii. Environmental considerations (potential benefits and adverse effects);
iii. Social considerations (potential impact on the people living within and around the Project area); Economic viability of implementation of the option.

Six (06) options were identified during the feasibility studies for the channel designs. The identified options were taken through a more rigorous assessment before selection of the preferred alternatives was done. The options identified were:

Option 1: Do Nothing Scenario

The "Do Nothing Scenario" is in equal measure the "No Project option" which implies that the proposed project should not be implemented. Under this scenario, the extent of flooding that currently occurs within the catchment will continue to happen with the situation becoming worse over time as the catchment continues to become even more developed due to the demands of providing additional housing within easy access to Kampala City.

The "Do Nothing Scenario" was considered unsustainable because the multiple benefits from implementing the proposed project would be foregone. In particular, this would mean that issues associated with frequent devastating floods such as pollution of receiving water bodies, damage to property and city infrastructure, loss of human lives, disease outbreaks, and paralysis of transportation city-wide would prevail while positive impacts such as job openings and safety for the local population along the channels would not occur. On this basis, the 'Do Nothing Scenario' was rejected as an option to be carried forward for the Project and project implementation option was maintained.

Option 2: Buy back the flood plain

This option takes into consideration that majority of the areas in the City that are currently experiencing floods are in the flood plains. Kampala is generally a City built on hills and it is therefore natural that the low lying areas receive storm water from the catchments. In the recent past, the development of Kampala has been unplanned, resulting in development of areas that are naturally meant to be floodplains. The basis of this option was to ensure minimal engineering works in terms of infrastructure development to control floods in the low-lying parts of the city, while allowing these low-lying areas to recover their original functions as floodplains.

However, implementation of this option would involve relocating people that are currently residing in the areas that are designated as 'flood plains'. This would require extremely high compensation costs since the people living and working within these areas would have to be relocated or given cash compensation. Thus this option was rejected to pave way for further evaluation of applicable options 3, 4, 5 and 6, due to the aforementioned high potential socio-economic impact.

Option 3: Retain / buy back areas for retention ponds in the upper reaches of individual catchments

This option would involve the creation of retention ponds in the upper reaches of the catchments with the aim of reducing the peak discharge into the drainage channels downstream of the retention ponds, and thus minimize on the frequency of flooding within the lower areas of the catchment which are more prone to flooding during storms. Development of flood retention ponds would also result in a reduction in the volume of outflow discharges into the downstream channel sections. This will have the desired effect of minimising the extent of channelization work required along the channel downstream of the retention pond i.e. reduced channel size and smaller culvert dimensions at road crossings.

Similar to Option 2, this would require extremely high compensation costs since the people living within these areas would have to be relocated or given cash compensation. The associated high compensation costs would render the Project unviable. For this reason, this option was rejected and options 4, 5, and 6 were evaluated for consideration.

Option 4: Combination of buy back the floodplain and retention within channel

This option would involve the creation of retention pond areas along the secondary drainage channels which are most affected by flooding during storms. The retention effects would reduce the discharge downstream resulting in reduced levels of flooding, thus lessening the resumption requirement downstream of the retention facility.

Notwithstanding these advantages, the economic assessment of this option found that similar to Options 2 and 3, this would require extremely high compensation costs since the people living within these areas would have to be relocated or given cash compensation thus rendering the Project unviable. As a result, this option was rejected for further consideration of options 5 and 6.

Option 5: Channelization

This option would involve conveying the entire flood discharge from the contributing catchments through the drainage channels up to the ultimate downstream discharge point. Depending on the state of the existing channels in the Project area, implementation of this option could involve widening, deepening and/or straightening, of the channels, replacement of road culverts, replacement of channel crossings, and establishment of access roads along the channels, among others.

The economic assessment of this option found it less costly than options 2, 3, and 4 because while it also involves relocation and compensation costs, these are comparatively less and hence rendering the project more economically viable. Based on this option's suitability for all project areas, manageability of the associated potential environmental and social impacts, financial feasibility and cost-effectiveness, it was taken on for application in the entire Project area.

Option 6: Inter Catchment Transfer

This option would involve diversion of part or all of the flood discharge to an adjacent catchment that is considered to be less prone to the effects of flooding. Only Secondary channel 6 in Lubigi catchment was considered for this option but even then, the high capital investment required to construct the diversion tunnel or open channel was found to be too high due to the required implementation technology. Based on the technical and social implication, this option was rejected.

Table ES 04 provides a summary of the results of the evaluation of options assessed for this Project.

Table ES 04: Summary of results of evaluation of options

Option	Channels for which option was considered	Channels for which option was selected for implementation	Reason
Option 1: Do Nothing Scenario	All primary and secondary channels	None	All the benefits of the Project will be foregone
Option 2: Buy back the flood plain	All primary and secondary channels	None	Most floodplains have been developed; therefore implementation would require very large compensation costs. This would make the Project unviable.
Option 3: Retain / buy back areas for retention ponds in upper reaches of individual catchments	Lubigi Primary (Sec 10 to Gayaza Road Roundabout); Sec 3, Sec 9, Sec 10, Kinawataka Primary; Sec 3, Sec 4,	None	Cost of land in Kampala is very high. Retaining land for retention ponds in the City would incur very high compensation costs, thus making the Project unviable.
Option 4: Combination of buy back the floodplain and retention within channel	All primary and secondary channels	None	Cost of land in Kampala is very high. Retaining land for retention ponds in the City would incur very high compensation costs, thus making the Project unviable.
Option 5: Channelization	All primary and secondary channels	All primary and secondary channels	This option will bring the much-needed relief to the flooding problem, and with costs that make the Project economically viable. This option had the least requirement for land take and therefore least social impact. The option also put into consideration the environmental aspect since channelization into wetlands was avoided.

Option	Channels for which option was considered	Channels for which option was selected for implementation	Reason
Option 6: Inter Catchment Transfer	Lubigi Sec 6	None	There are no suitable adjoining catchments where inter-catchment transfer can be made to work without shifting the problems from one bad catchment situation into another catchment which is in equally as bad situation.

Note: Considering the environmental benefits associated with the use of retention ponds within the catchments, and the fact that options 3 and 4 (that require retention ponds) were rejected purely on the basis of the amount of compensation that would be required; the use of retention ponds at the sites identified as suitable during the design studies should be put into consideration for implementation in the near future as funds to enable relocation become available. This will enable an integrated solution to the City's drainage problems since the addition of retention ponds into the selected catchments will serve to further minimize the occurrence of flooding, as well as greatly contribute to the improvement of the water quality that eventually feeds into the receiving streams.

09. Permits

Implementation of the Project will require KCCA to obtain the necessary permits in line with the laws of Uganda. Table ES 05 provides a list of the identified permits that KCCA will obtain before implementation of the proposed drainage improvement project. KCCA will work with the various government agencies and identify and obtain any other permits deemed necessary for Project implementation.

Table ES 05: Permits to be acquired for Project implementation

Permit	Responsible Agency	Reason for Permit
Surface Water abstraction permit	DWRM	• Water abstraction for construction works from natural water courses.
Permit to carry out a regulated activity in a wetland/riverbank/lakeshore	NEMA	• Construction or excavation within a wetland and/or water body such as a lake or river.
Permit for demolition of existing structures	KCCA	• Demolition of structures within the project area e.g. perimeter walls, pit latrines, houses too close to the channels, existing lining of drainage channels in some sections that will have to be expanded.
Permit for excavation	KCCA	• Excavation of wider channel cross-sections • Excavation for retention pond area • Tunnelling or deep excavation for inter-catchment transfer infrastructure.

Permit	Responsible Agency	Reason for Permit
Permit for hoarding and scaffolding	KCCA	• Hoarding may be required in areas that are very close to residential houses, for safety purposes. • Scaffolding may be required in sections that have loose soils, or require deep excavations, for the safety of construction workers.
Certificate of good structural practice	KCCA	• The designs for drainage infrastructure will have to be approved, as being in accordance with the latest British or Euro codes of Practice, by the Directorate of Engineering and Technical Services in KCCA.

010. Key findings from Stakeholder Engagement

Consultations with the stakeholders were held between August 2015 and April 2016. Some of the key issues/ expectations raised during the consultations are summarised in Table ES 06.

Table ES 06: Summary of key issues from the consultation meetings

Stakeholder	Key issues
Directorate of Water Resources Management (DWRM), Ministry of Water and Environment	The causes of flooding should be carefully studied such that the solutions proposed by the design team are actually effective for the long term. In the past, channels have been widened in some places with no reduction of the flooding problem in the area. The ESIA study should clearly state that bare ground in the catchment areas is a major problem as it greatly contributes to siltation / sedimentation. Recommendations can include policy changes to encourage increasing green / vegetation cover, and improving waste management.
	The Kampala drainage system impacts on the ecosystem should be exhaustively investigated during the study. The status of the receiving wetlands should be considered because previously, the impacts of Greater Kampala Metropolitan drainage channels on receiving water bodies have not been carefully assessed. Case in point is the Nakivubo Channel that has greatly contributed to the pollution of the Murchison Bay on Lake Victoria.
	The Project does not have any statutory requirements, unless inter-catchment transfer structures are to be constructed. Construction of hydraulic structures requires a permit. If water abstraction for construction works has to be done, permits will have to be acquired.
National Water and Sewerage Corporation (NWSC)	Sewerage systems share the same profiles as drainage systems. Thus some of the intended channels are located where NWSC has existing infrastructure and has already compensated the communities. To avoid double compensation KCCA should work with NWSC to share the implemented compensation database.

Stakeholder	Key issues
	KCCA drainage project needs to take into account NWSC sanitation plan for the existing and planned systems.
	If any of the existing NWSC infrastructures must be relocated, KCCA will be responsible, but should work with NWSC.
Buganda Land Board (BLB)	The design of the current drainage channels might not necessarily be the problem with the system. The garbage disposal problem in the City is a major problem and until this is solved, the flooding problem will continue.
	Serious consideration should be accorded to land tenure matters during the compensation e.g. 50 year lease versus 3 years left on the lease. These should be handled specific to the lease. When the lease expires, the land reverts to the kibanja status.
	Government compulsory acquisition does not give the land owner the option to refuse to give up their land for the Project. The Buganda Land Board will not stand in the way of development, for the public good.
	What is the Buganda Land Board role with people with sales agreements?
	The Buganda Land Board (BLB) is the only organisation with the mandate to verify land ownership on Kabaka's Land. 'Baami ba Kabaka' are only delegated by the Board.
	Strip maps from the Project should be passed on to the BLB for registration. This will involve identifying those who have registered with the shs. 600,000 and those who have not. In addition, people with land titles sometimes have arrears with their ground rent and these should also be verified through the BLB.
	The BLB has a survey unit that should be involved in the Project's surveying and valuation work.
	Special consideration should be made for large entities such as BLB.
	The BLB has land titles for vast pieces of land. One company took land titles from the BLB in 2005 for the Northern Bypass and is still holding them to date. The titles should not be taken by Government. Instead, mutation forms and photocopies of the land titles should suffice for the purposes of this Project.
Wetlands Management Department (WMD), Ministry of Water and Environment (MWE)	KCCA needs to liaise with Ministry of Lands to go about the issue of resettlement from wetlands.
	The problems with the drainage system in Kampala are beyond Engineering solutions only. A wholesome solution needs to be used in order of solve the problem.
	The disposal of silt from the channels is also a big challenge. A NEMA-approved dump site needs to be approved for use.
	Wider channels have the implication that more water will be poured into water bodies untreated. The wetland sections should be enhanced and lagoons built to enhance the waste treatment before discharge into the receiving water bodies such as Lake Victoria.

Stakeholder	Key issues
	Resettlement of areas within industrial parks will be difficult.
Office of the Chief Government Valuer (CGV)	Establish communication links with key stakeholders like NEMA, KCCA, and Buganda Land Board among others.
	Work schedule should be made so we can measure performance.
	There is urgent need to seek clarification with KCCA and NEMA if they have some gazetted corridors and if they will be considered for compensation.
	Disturbance allowance of 30% is to be considered since KCCA wants to start the Project as soon as possible.
	Seasonal crops should be included in the assessment since there is limited time to carry out the land acquisition and compensation.
Occupational Safety and Health (OSH) Department , Ministry of Gender, Labour and Social Development (MGLSD)	The Project policy and tender documents prepared for consultants and contractors should clearly state the responsible parties for the implementation of the mitigation measures.
	Committees for ensuring the implementation of health and safety measures should be in place, during both construction and operation phases.
	The Project should prepare an OSH policy for both construction and operation phases, which should include an HIV/AIDS policy.
	Instead of recommending PPE in the ESMP, emphasis should be put on developing an OSH programme. MoGLSD should be listed in the ESMP as one of the responsible agencies for supervising the implementation of the ESMP.
	Improved health and safety should be expounded on as a positive impact because this Project will definitely improve the health situation in the Project areas by reducing on the risk of outbreak of water borne diseases.
	To ensure success of this Project, the community involvement component must be clearly indicated. The communities should be made to appreciate the Project so that they contribute towards the maintenance of the channels. This will involve improved solid waste management practices.
	Stakeholder involvement should be provided for in project implementation, during both construction, and operation and maintenance phases.
	KCCA needs to have a **s**anitation programme and Public health component so as to improve the Solid waste management within the City.
	National Water and Sewerage Corporation has a pro-poor project. They should work together with KCCA.
Division Leaders (Town Clerk's Office, Councillors, Local Council Chairpersons) Kawempe Division	Project Design
	How wide is the channel?
	Where exactly will the channels pass? What are the start and end points?
	Regarding the channel design width, where does 3 m start? Width of channel has not been very clearly stipulated.

Stakeholder	Key issues
Makindye Division Lubaga Division Nakawa Division Central Division Wakiso District	Access roads should be a must. They are very necessary for collection of the desilted waste from channels, as well as garbage collection.
	When does construction start?
	Rails for safety, especially for children, should be incorporated into the designs.
	Involvement of local area leaders in Project
	How will the local area leaders be involved in the Project?
	Will the local area leaders be given any allowance or facilitation?
	In other projects, the PDC is usually integrated into the project to ensure that the work is executed in a manner that the community embraces. The PDCs should therefore be involved in this project.
	RAP Study
	Some residents have reported seeing surveyors going through their land and the communities. The local area leaders should have been informed prior to any field studies.
	How will the title holder, Kibanja owner and tenant be paid?
	The Buganda Land Board should be consulted, as a major land owner in the area, and also included on the Grievance Committee.
	Should people carry on with their developments e.g. planting trees, crops, buildings etc.?
	What if the Project is delayed after the RAP process is finalized?
	How will the Project proceed if there are land wrangles in some sections?
	Should people continue to register their land with Buganda Land Board?
Community members in Project Area (FAQs)	Project Design and Timelines
	When will the Project start exactly because some people passed through?
	How far from the current channel will the new channel extend?
	Will tertiary channels also be worked on?
	Will this project actually be implemented? The example of Bwaise channel in Lubigi was implemented but is not being maintained. Won't this same problem affect these proposed channels?
	Will all the channels be worked on in this project?
	Is it possible for the channel width to be reduced from the 14m to at least 10m?
	The local leaders in the area are not properly informing the people about the Project. The people need proper notice so that everyone can be properly prepared.
	People in Wetlands

Stakeholder	Key issues
	Most people are within wetlands. Will these be compensated?
	NEMA identified people in the area within wetlands and those are recognized. Those who built afterwards will not be recognized. Is this the case?
	Will the project consultants be working with NEMA? Considering that people are in wetlands.
	It is possible that there could be delays in the project, as opposed to doing the valuation and taking up to 5 years without implementing.
	RAP and Compensation
	KCCA usually demolishes people's infrastructure without notice or compensation. What guarantee do people have that this Project will be any different?
	Most of this area is on Kabaka's land. How will these be catered for since people have just finished paying for their tenancy at the Buganda Land Board?
	Most land purchases are done with agreements. Will these also be paid for?
	What happens if a landowner passed away?
	During valuation work, the PAPs are not told the amount they will be compensated. Is it that the structures will be demolished before the compensation payment has been made?
	The brochure talks about land titles and landowners. What about individuals with no land titles, but only agreements?
	How will schools be dealt with, especially if the time/ notice is short?
	Will structures be paid based on what will be affected for example if a veranda is within the project corridor, will the entire house be compensated?
	Plots with no developments, how are they going to be catered for?
	What happens if the space left after the Project affected area is very small?
	Will people be paid first before they are asked to leave?
	How wide will the access be?
	In which category do leaseholders fall?
	What happens if someone is not in the Project area but their structures are to be affected?
	Identification before payment is crucial. Some Projects have people being paid when they are not the legitimate owners.
	In this area, there was no channel in existence. People created the channel to create relief to flooding; will those who invested in lining the channels be compensated? Most people in the area lined the sections of the channels near their homes.

Similar comments were received from majority of the stakeholders. Most feedback from the dicussions with Institutions, Local area leaders, and community members could be categorized as

related to Project design and timing, land acquisition and compensation, maintenance of the channels during operation, particularly management of solid waste and de-silting, and job opportunities. Table ES 07 provides a summary to the responses to the Frequently Asked Questions (FAQs) from Stakeholders, and how the various concerns were incorporated into the Project, to ensure that stakeholders' concerns are adequately addressed.

Table ES 07: Summary of responses to FAQs from Stakeholders

Aspect	Response	Adoption into Project
Project design and timing	Channelization is not the only option being considered. Other options include use of retention ponds (within the channel or in upper reaches of individual catchments), and inter-catchment transfer.	Project alternatives during Project design considered the various options to eventually choose the best combination of options
	This project is restricted to the primary and secondary channels, but facilities will be provided for inlets into the channels within the 3 m access roads required on both sides.	This was restricted by the Project scope.
	Construction phase is planned to start in mid-2016, with the Project phased to last about five (05) years.	Timelines were variable and KCCA could not start within planned time.
	The Design Engineers will not compromise on the effectiveness of the channels. However, the Engineers are doing whatever is possible to minimize the land take requirements of the Project.	Project alternatives during Project design considered the various options to eventually choose the best combination of options
Land acquisition and compensation	The valuation surveyors will be contracted by KCCA, the Project developer. However, the rates estimated by the valuation surveyors are submitted to the Chief Government Valuer (CGV) for approval; so government is involved in the project.	Considered in RAP process
	This is a World Bank Project and therefore World Bank Guidelines will be followed. The WB Guidelines stipulate that all people affected persons are compensated, according to their ownership status.	Considered in RAP process
	Different rates for land owners, kibanja holders, and tenants will apply. The kibanja owner gets 70% of the value since they are the ones occupying the land; title owner gets 30% of the value. The tenants get compensation for the equivalent of their losses from the land, for example costs for loss of income as they find alternative tenantable land on which to carry out their economic activities.	Considered in RAP process

Aspect	Response	Adoption into Project
	The World Bank Guidelines emphasise that present day value of assets is used during valuation. The market value of building materials will be used, while current district rates for Kampala district will be used for agricultural possessions such as trees and crops.	Considered in RAP process
	There will be a Grievance Committee to try and settle any disputes of aggrieved project affected people? However, the entire Project will not be stalled on account of a few individuals. An example is the construction of the Northern bypass which started and skipped over the sections with unresolved land issues.	Grievance Management Process recommended in the ESIA/ ESMMP.
Maintenance of the channels during operation, particularly management of solid waste and de-silting	Dredging of silt is part of a channel's maintenance during operation. One of the challenges to this exercise with the current channels has been lack of access to transport away the dredged material. Once this Project is implemented, it will be easier to dredge the channels of silt.	Provision for access roads made during Project design because if concern on poor maintenance of existing channels.
	KCCA will have to take a multifaceted approach to solve the City's flooding problem. Currently, some urban division councils are taking on garbage collection contractors to manage the solid waste. Such steps will go a long way in contribution to the flooding solution.	Commitments made in ESMMP to improve the City's waste management.
Job opportunities	Community members interested in getting jobs will have to be proactive and approach the Project Contractors when these are commissioned to start work. The ESIA report has made a recommendation for KCCA to oblige any contractors of the Project to hire the local community members to the extent of the available skill available, especially for unskilled labour.	Commitments made in ESMMP to allow for local recruitment, while also providing for stringent measures against gender-based violence, violence against children andchild labour in the ESMMP.

Public Disclosure

NEMA, to whom the Environmental and Social Impact Statement is submitted for review and approval, is also responsible for disclosure of the report in public libraries and at Division headquarters of Kampala District where the Project is located. The Environmental Impact Statement shall also be placed on the Proponent's website for review and comments.

011. Potential Environmental and Social Impacts Identified and their Assessment

An in-depth assessment of the potential impacts during the pre-construction, construction, and post-construction (operation and maintenance (O&M)) phases of the Project was conducted. Enhancement measures for the positive impacts that are presented augment the Project's benefits while mitigation measures are presented to avoid, minimize/reduce, or compensate/offset the identified adverse impacts. Table ES 08 and ES 09 provide summaries of the identified impacts, significance of impacts assessed, and mitigation measures recommended in order to reduce the severity of the impacts identified to as low as reasonably practicable.

Table ES 08: Summary of Potential Negative Impacts and Impact Ranking

Ref. No.	Potential Impact	Likelihood of occurrence	Severity of Impact	Impact Significance
7.1.1	Pre-construction Phase – Socio-economic Environment			
7.1.1.1	Land Take / Involuntary Resettlement	High	High	Major
7.1.1.2	Disruption of normal routine	High	Negligible	Negligible
7.1.1.3	Economic displacement	High	Medium	Major
	Construction Phase - Socio-economic Environment			
7.2.2.1	Flooding due to Construction Works /Channel Diversions	High	High	Major
7.2.2.2.1	OHS Risks - Sanitation Risk	High	High	Major
7.2.2.2.2	OHS Risks - Construction Activity Hazards	Medium	High	Major
7.2.2.2.3	OHS Risks - Risks Associated with social Interaction with construction Workers	High	Medium	Moderate
7.2.2.3	Traffic Disruption	High	High	Major
7.2.2.4	Interference with Other Service Infrastructure	High	High	Major
7.2.2.5	Damage to Existing Infrastructure	Medium	Medium	Minor-Moderate
7.2.2.6	Impact on Physical Cultural Resources (PCR)	Low	High	Moderate
7.3.1	Construction Phase - Bio-physical Environment			
7.3.1.1	Soil Erosion and Degradation	High	Medium	Moderate
7.3.1.2	Air Pollution	High	Medium	Moderate
7.3.1.3	Disturbance due to noise pollution and vibrations	High	High	Major
7.3.1.4	Improper management of Project generated waste	High	High	Major
7.3.1.5	Impact on Ecological Environment	Low	Medium	Minor
7.4.2	Post Construction (Operation and Maintenance) Phase – Socio-Economic Environment			
7.4.2.1	Loss of income from Project-related activities	High	Negligible	Negligible
7.4.2.2	Risks to Community Health and Safety	Low	High	Moderate
7.5.2	Post Construction (Operation and Maintenance) Phase – Bio-physical Environment			
7.5.2.1	Air Pollution	High	Low	Minor
7.5.2.2	Disturbance due to Noise Pollution and Vibrations	High	Low	Minor
7.5.2.3	Improper Management of Waste from Channel maintenance	Low	High	Moderate

Ref. No.	Potential Impact	Likelihood of occurrence	Severity of Impact	Impact Significance
7.5.2.4	Impact on water resources and receiving habitat	High	High	Major

Table ES 09: Summary of Recommended Enhancement and Mitigation Measures

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
	PRE-CONSTRUCTION PHASE	
7.1.1	Socio-economic Environment - Negative Impacts	
7.1.1.1	Land Take / Involuntary Resettlement The improvement of priority drainage systems in Kampala will require increasing the channels' width and re-alignment of the channels in some sections. Thus, about 3000 households' property will be affected by the Project implementation, especially in the densely populated slum areas	I. All efforts will be made to avoid loss of structures especially by optimising the re-alignment options for the least PAPs undertaken in consultation with the affected people. II. A Resettlement Action Plan will be developed to guide the compensation and resettlement process in line with Ugandan laws. The Plan will also be developed in accordance with World Bank OP 4.12 for Involuntary Resettlement. III. Timely sensitizations and consultations with affected persons will be done. IV. In line with World Bank OP 4.12, a Grievance Mechanism was developed that will guide any unsatisfied or disgruntled persons during or after the compensation process, as a measure to minimize the severity of the impact of involuntary resettlement. V. KCCA, as the Project developer, will provide adequate and fair compensation (as approved by the Chief Government Valuer) to the project affected persons, before the commencement of Project activities. VI. Clear guidelines will be developed to assist any affected community members identified as vulnerable during the RAP process.
7.1.1.2	Disruption of normal routine Considering the land take requirements of this Project, and the required RAP process in line with the World Bank's OP 4.12 that involves sensitization meetings, survey and valuation, census surveys, among other procedures; people in the Project area get disrupted from their daily routine in order to	I. The people targeted to attend community meetings will be given adequate notice so that they can plan their activities appropriately. II. The surveyors and valuers will give ample notice regarding the times and dates in which they will be in a given location within the Project area, so that people of interest are aware of the progress, and are available at the time.

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
	participate in the process.	
7.1.1.3	Economic displacement The land take impact associated with the implementation of this Project will also result in economic displacement in areas where economic activities are being conducted along the channel lengths. A number of small food markets, kiosks, nursery beds, car washing bays, among other activities were identified as likely to be affected.	I. All efforts will be made to avoid economic displacement especially by optimising the re-alignment options for the least PAPs undertaken in consultation with the affected people. II. A Resettlement Action Plan will be developed to guide the compensation and resettlement process in line with Ugandan laws. The Plan will also be developed in accordance with World Bank OP 4.12 for Involuntary Resettlement. This Plan will take into consideration the compensation for economic displacement. III. Timely sensitizations and consultations with affected persons will be done. The process of consultations and sensitizations was started in October 2015 and will continue until all affected communities and persons have been engaged. IV. In line with World Bank OP 4.12, a Grievance Mechanism was developed to guide any unsatisfied or disgruntled persons during or after the compensation process, as a measure to minimize the severity of the impact of involuntary resettlement, in particular those whose businesses will be affected.
	CONSTRUCTION PHASE	
7.2.1	Socio-economic Environment - Positive Impacts	
7.2.1.1	Income to material / equipment suppliers and contractors Construction and upgrade of the road and drainage structures will require materials such as gravel, aggregate, sand, murram, asphalt, and Portland cement. This presents financial benefit for local and foreign suppliers	I. The Contractors and sub-contractors will purchase materials from licenced quarry sites, to reduce environmental degradation as a result of the project implementation.
7.2.1.2	Employment and Skills Training Construction of the drainage systems will avail over 500 skilled and unskilled job opportunities, especially to the youths in the area who need the employment.	I. KCCA will require the contractors to use locally available labour, to the extent possible, depending on the level of skill required vis à vis what is available. II. The Project will present an opportunity to enhance the skills of Ugandans in various fields such as Engineering, Surveying, Project Management, as well as artisans such as masons, and mechanics. III. The Contractors will be obligated to work within Uganda's labour laws (Employment Act), including

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		restrictions on child labour especially where it can interfere with the child's education.
7.2.1.3	Benefit to local retail businesses The construction workers on this Project will need food stuffs, drinks and other assorted items which they will be able to purchase from nearby retail shops.	I. Contractors and subcontractors will encourage their workers to support businesses that conduct their businesses in line with national laws and KCCA bylaws and regulations. II. During the sensitization meetings with local communities, the local residents need to be informed about the Project and how their businesses can benefit from the Project.
7.2.2	Socio-economic Environment- Negative Impacts	
7.2.2.1	Flooding due to Construction Works /Channel Diversions Depending on the phasing of the construction works, the method of construction, and the timing of the works, there is a risk of water diversion causing floods during construction.	I. The phasing of construction works will be such that the majority of works are undertaken during the dry season to reduce the risk of constrictions in the drainage system during the rainy season. Construction will not be started where critical access roads or channel sections cannot be completed before the start of rainy season. II. The Contractors will use best available methods of construction to minimize the risk of blockages and constrictions during construction.
7.2.2.2.1	OHS Risks - Sanitation Risk This Project will require widening of the channel corridor, especially considering the proposed access roads for channel maintenance. This will majorly be because of the already existing fragile sanitation system where pit latrines and bathrooms are lined along the channel edges and in most cases are emptied into the channels.	I. All workers, including sub-contractors and casual labourers, will undergo an environmental, health and safety induction before commencing work on site. II. A licensed hazard material contractor will be engaged to handle sludge from pit latrines that have to be demolished to allow for Project implementation. II. KCCA, as the Project Developer, will give ample time to Project affected residents to relocate or have other sanitary units constructed, as required. V. The Contractor will be required to secure the excavated sites by way of hoarding or installation of barricades to avoid access by the local population. V. Alternative safer access points will be established along with guiding warning signage to guide the communities from the safety hazards
7.2.2.2.2	OHS Risks - Construction Activity Hazards Construction activities by their nature possess a degree of risk, such as lifting heavy materials, working at heights or in confined	I. Orient all construction workers on safe work practices and ensure that they are adhered to. II. Safety training will be conducted routinely on how to prevent and manage incidences on site. III. All tasks will be performed by qualified and authorised personnel for the particular tasks.

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
	spaces. Carrying out construction activities in drainage channels along busy roads further increases the workers' exposure to the risk of accidents from on-coming vehicular and cyclic traffic.	IV. OHS signage that is clear and visibly displayed will be used to warn off residents, curious passers-by and project employees of dangerous areas such as deep trenches or slippery areas along the channels. V. The Project Contractors and sub-contractors will be required to provide appropriate PPE for their workers to ensure that any risks are minimized to a level that is As Low As Reasonably Practicable (ALARP).
7.2.2.2.3	OHS Risks - Risks Associated with social Interaction with construction Workers The construction workforce for the drainage channels will likely interact with the communities along the drainage channels during construction. Baseline studies revealed that a majority of the channels are lined by houses, oftentimes along the channel's very edge.	**General Recommendations** i. All Contractors shall be required to develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the Contractor's Human Resource Mannual. ii. Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women; iii. In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, establishment of a grievance log book at each project site and suggestion boxes should be established. **HIV/AIDS** I. As a contractual obligation, contractors will be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during Project execution. II. All construction workers will be orientated and sensitized about responsible sexual behaviour with Project area communities. III. As part of their Corporate Social Responsibility, the Contractor in coordination with KCCA will conduct HIV/AIDS awareness campaigns in the Project areas, particularly in slum areas, to avoid reckless lifestyle and spread of the disease in the area. iv. HIV/AIDS policies shall be developed at workplace

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		and Contractors should provide Free HIV/AIDS testing, counselling and condom distribution for both workers and local community; V. Management of Social bonding at work place: The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. Social bonds are not readily controlled and the permanence of HIV/AIDS transmission makes this particular impact of social bonding both negative and also positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual exploitation can also occur. Thus, the issue of social bonding will be tackled with firmness and fairness, forbidding power relationships, which lead to exploitation of mostly women and children, while encouraging relationships that could lead to permanent situations; **Gender based violence, violence against children and child labour** I. The project contract should be drafted on the backbone of the constitution of Uganda and on the labour and employment Act not with holding the gender policy and other relevant regulations. II. Under project contract, a clause protecting against gender based violence, violence against children and child labour will be included, carrying sanctions upon breach of contract like withholding payments. III. The Contractors and Subcontractors will be contractually bound to protect against gender based violence, violence against children and child labour by signing 'Code of Conduct for Contractors' which may transpire same penalties like that of the project contract clause on the subject. IV. The Contractors and Subcontractors will be contractually bound to protect against gender based violence, violence against children and child labour by signing 'Code of Conduct for Contractors' that will carry sanctions upon breach of contract. V. The contractor will have an Orientation on all the labour laws including the child labour law before starting works. VI. Local area leaders in the Project areas will be asked to allow time particulary for the discussion of issues related to the Project during their regular village and committee meetings.

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		VII. The Construction Supervision Consultant will have a Community Liaison Officer who will be responsible for logging and monitoting the redress of grievances.
7.2.2.3	Traffic Disruption Construction activities will cause disruption to traffic flow as a result of construction material delivery trucks to various channel sections undergoing construction.	I. The phasing of construction works will be such that the majority of works are undertaken during the dry season to reduce traffic impact on existing roads. ii. The Contractor will prepare a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings. iii. Appropriate safety signs shall be used during construction (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) during the construction period.
7.2.2.4	Interference with Other Service Infrastructure Service infrastructure such as water mains/pipes was installed across the drainage channels in some parts and will have to be relocated during Project implementation.	I. Project implementation will be done in close consultation with the respective utility service companies such as NWSC, UMEME and telecommunication companies. II. All identifiable utility service lines in the right of way will be relocated in the pre-construction phase prior to the commencement of works to avoid interruptions from damage during the construction phase. Interference from service shut-down during the process shall be communicated to the potentially affected communities in advance II. During construction, the Contractor will have to prepare a work schedule, which will be closely monitored and supervised by KCCA. iv. Where the local infrastructure including community access roads is likely to be interfered with, the Contractors will ensure regular community engagements to alert them of the likely temporary blockades and the duration to avoid local outrage and opposition to the project. v. The Traffic Management Plan shall be prepared with well laid out procedures on shared use of community access roads specifying measures to avoid interruptions during peak hours. vi. Different avenues for receiving grievances from the local communities shall be established including the grievance book at the project sites and suggestion boxes in open areas. These should be made known to the local communities.

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		VII. The communities to be affected by any interference in service provision (water, electricity, or telecommunication signals) will be given ample warning and alternatives provided by the service provider, wherever possible.
7.2.2.5	Damage to Existing Infrastructure The non-hard surface roads in the areas where the drainage channels are located will be used for accessing the channels during the construction and O&M. The damage to existing public roads could be due to considerable volume of construction traffic using the existing roads and passage of heavy construction equipment.	I. Rectification installation of the service infrastructure that intersects with the drainage channels will be planned to take the shortest time possible to minimise disruption of service for the users' communities. II. Trucks ferrying materials will be loaded commensurate with the recommended axle load for a given road to avoid or minimize damage. III. Use locally sourced materials, whenever possible, to minimize travel distances and expanse of road damaged. IV. Some of the roads will be upgraded to allow easy movement of vehicles and transportation of materials.
7.2.2.6	Impact on Physical Cultural Resources (PCR) The project area is mostly developed with buildings including residential, industrial, schools, clinics, churches, and hospitals.	I. A Chance Finds Procedure has been developed as part of the Environmental and Social Management and Monitoring Plan, to guide the handling of any chance finds during project implementation. II. Further still, the contractor shall develop and implement avoidance procedures. In the event of human remains, there shall be no further excavations or disturbance of the site until the responsible police authorities have been informed. III. In areas not covered by this ESIA, such as quarry sites and borrow pits, Project Briefs or ESIA will be conducted in line with NEMA requirements. The presence of any PCRs in such sites will investigated during these studies.
7.3.1	Bio-physical Environment - Negative Impacts	
7.3.1.1	Soil Erosion and Degradation Construction of drainage channels will impact soils prone to erosion, due to textural or slope characteristics. Higher slopes (up to 25% - 30%) were observed as characteristic of upstream sections of secondary channels especially in the Kansanga – Gaba catchment area	I. Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared and submitted by the contractor to KCCA for approval. The CEMP will include measures such as: II. Clearance of vegetation will be limited to areas that will be required for construction of drainage channels. This will serve to minimize land disturbance as much as possible. III. ii) Excavation of trenches to construct drainage

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		channels will be done in a phased manner such that soil is not exposed for a long time before the channels are lined. IV. Excavated material will be collected routinely such that heaps of exposed soils are not left in the Project area for long.
7.3.1.2	Air Pollution Exhaust emissions and fugitive dust emissions as a result of construction activities will occur during the construction phase.	I. Sensitisation of local residents will be undertaken prior to the start of the construction works. II. Delivery vehicles will be switched off when not in use so as to minimize the release of fugitive emissions; III. Contractor's vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimise potential emissions; IV. Trucks delivering materials will be covered with tarpaulin to reduce the risk of fugitive dust emissions, especially in busy residential and commercial areas; V. Stockpiling of the excavated materials to drain before haulage should not be located around or close to the residential areas to reduce excessive exposure to the smell.
7.3.1.3	Disturbance due to noise pollution and vibrations Construction vehicles and machinery including bulldozers, graders, compactors and dump trucks during channels' trench preparation will generate noise and vibrations.	I. Sensitisation of local residents will be undertaken prior to the start of the construction works. II. The Contractors on site shall be made aware of, and adhere to, the regulatory noise limits for a construction site in a commercial area (75 dBA) and that in a residential area (60 dBA) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003. III. Construction workers shall be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.
7.3.1.4	Improper management of Project generated waste The construction activities of masonry lined channels (lining of stone, Armorflex ©, or Cable Concrete©) and road crossings such as culverts and bridges, will produce a considerable amount of construction waste. Demolition of structures within the channel corridor will be a major part of the project implementation.	I. A waste management plan will be developed by the Construction Contractors, and approved by KCCA to ensure that measures for handling all Project-generated waste are in place. It should be considered that in some sections, the silted material could be hazardous, particularly areas within and downstream of industrial areas and slums. Silt in such locations should be tested, and if found to be hazardous, should be handled by a licensed waste contractor for hazardous waste. II. The principles of an integrated solid waste management system will be implemented i.e.

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		reduction at source, reuse and recycle. III. Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage. V. Construction waste shall not be left in stockpiles along roads, but removed and reused or disposed of on a regular basis. V. Human waste will be properly managed through provision of onsite portable toilets, with consideration for the number of workers on site during construction. Separate toilets will be provided for female workers. VI. Any hazardous wastes generated by construction activities (e.g. emptying pit latrine contents) will be collected and transported off site to the appropriate licensed waste storage facility (NWSC treatment plants) for treatment prior to final disposal by a licensed contractor for hazardous waste.
7.3.1.5	Impact on Ecological Environment Most of the impacts on ecology will be due to vegetation clearance, road kills and harassment of reptiles. Any reduction in the spatial extent of the existing wetlands contributes to reduced ecosystem services and habitat for the identified range of bird species and wetland fauna. This however is true in areas where wetlands are intact and project activites traverse those wetland systems. Kinawataka, Kasanga, and Lubigi channels traverse areas that have been altered by human activities thereby reducing the likelihood of the impact	I. No permanent wetland ecosystem conversion to channel corridor will occur as per the Project designs. Where the channel interfaces the wetlands along the Gabba and Kansanga Channels, a bell-mouth structure will be constructed to enable the release of stormwater into the wetland system for the natural sequestration services by the wetland ecosystems. This will avoid direct release of contaminants into Lake Victoria. II. The Supervision Engineer shall recruit a competent environmentalist with a strong background in ecology to conduct regular monitoring of project implementation to ensure that the project works are limited to the design extents. III. Wetland sections closet to the project sites will be first inspected to identify if there are any breeding sites or nesting areas, and if possible try to avoid them or minimize vegetation clearance in such areas. IV. The Contractor must avoid the impediment to water flow in the channels during and after construction work. V. During construction habitat disturbance should be minimized as much as possible. Vegetation clearance should always be done first, as this scares away some amphibians and reptiles, as opposed to direct use of graders to clear land, or

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		direct dumping of construction materials and excavated soils. VI. Restoration of any access roads will be done by the Contractor, particularly in the wetlands. VII. The construction workforce should be encouraged and sensitised not to harass herpetiles. VIII. The contractor must not dump construction waste in the wetlands. IX. To further minimise the potential impact on the degraded Lubigi wetland, the proposed initial width of Lubigi channel will be reduced from 160m to 100m as illustrated in Figure 7-16. KCCA will however aquire the entire 160m width corridor and protect it from further degradation. Concrete pillars will be established to demarcate the acquired wetland section for strict protection from encroachment.
	POST CONSTRUCTION (OPERATION AND MAINTENANCE) PHASE	
7.4.1	Positive Impacts - Socio-economic Environment	
7.4.1.1	Improved Storm Water Drainage Implementation of this Project will go a long way in solving Kampala's stormwater management problems such that flooding after rainstorms becomes a very rare occurrence, especially in the Catchment areas of Lubigi, Kansanga, Gaba and Kinawataka.	I. Construction material and methods will be according to design standards such as those for Roads and Bridges so as to ensure that the drainage system infrastructure is efficient throughout the design life. II. The Project Design has incorporated box culverts into the channel designs, to replace pipe culverts in locations where pipe culverts were identified to be inefficient on storm water conveyance. III. KCCA will improve the solid waste management in the City to alleviate the existing problem of blockage of culverts and drainage channels by garbage. IV. Development of a Policy or Bylaw by KCCA to encourage the planting of vegetation (grass, shrubs, flowers) to reduce the bare surface area in the City, and in effect reduce siltation in the channels.
7.4.1.2	Improved Community Health and Safety Improvement of the drainage infrastructure, including channel widening and deepening, and culvert replacement to ensure water can be adequately conveyed at different sections will result in a more efficient	I. Regular maintenance works will be undertaken by KCCA to ensure that the channels are always in proper working condition, and thus avoid the current state of blocked or broken culverts. II. Regular sensitisation campaigns in the City will be undertaken to encourage respect of the drainage channel corridor for access for maintenance purposes. III. Integration of a solid waste management program

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
	conveyance of storm water.	with the drainage Project to reduce the risk of blocked culverts as a result of garbage disposal into the drainage channels. IV. A mega sensitisation campaign in the City will be undertaken to encourage respect of the drainage channel corridor for access for maintenance purposes, and wetlands for flood retention purposes. V. Sanitation Committees will be selected at the village level to encourage community involvement and participation in keeping the City clean. VI. KCCA, with the assistance of area local leaders will implement stringent fines on improper garbage disposal, inorder to discourage irresponsible waste disposal.
7.4.1.3	Access Roads for Maintenance Access roads will be constructed to allow for maintenance of the channels.	I. Markers to indicate the extent of the channels will be provided for the channels to enhance community safety and minimize the risk of falling into the channels. II. In order to guard against encroachment of the 3 m access roads along the channels, 500 mm high concrete bollards will be placed at about 25 m intervals along the channel edges. III. Community sensitization will be done to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour. V. Community sensitization will be done to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance.
7.4.1.4	Improvement of Community Access across the Channels As part of the project, footpaths and channel crossings such as culverts and bridges will be replaced or installed in areas where they did not exist to make pedestrian and cyclic traffic much safer for the general population.	I. The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. II. Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels. III. Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.
7.4.1.5	Channel Beautification As a way to soften the hard (concrete) landscape that the drainage corridor will inevitably bring into the neighbourhoods,	I. The Project will make provision for benches and seating areas to allow the community use the space for leisure parks, where feasible. II. Inclusion of walk ways, jogging and bike lanes within these landscaped spaces to allow for

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
	plants that can fit within a narrow belt with leafy foliage that can grow to a height of 3 m are proposed.	community utilization of these public spaces. III. Use of spaces in selected areas for utilization in specific commercial activities such as tree and flower beds. This can be a source of revenue for KCCA as well as source of employment for the traders. IV. Provision of trash bins and undertaking of waste management awareness campaigns to reduce or even eliminate the chance of waste ending up in the drainage channels.
7.4.1.6	Improvement of other Service Infrastructure A number of service infrastructures such as water pipes and communication cables that run along or across some sections of the channels will have to be removed and replaced during Project implementation.	I. Rectification installation of the service infrastructure that intersects with the drainages to be upgraded should be planned to take the shortest time possible to minimise disruption of service for the users' communities. II. Conduits for future service infrastructure projects will be budgeted for and included in the Project construction scope, for example at culvert road crossings and channel crossings.
7.4.2	Negative Impacts - Socio-economic Environment	
7.4.2.1	Loss of income from Project-related activities As the Project draws to a close after the two year construction period, a number of people who had previously been benefiting financially from the Project, such as casual labourers, material suppliers, masons, technical people such as Engineers and Surveyors, among others will lose the financial benefits they had come to rely on.	I. All people taken on to work on this Project will be informed about its duration and phasing beforehand, so that they can plan accordingly. II. The KCCA Supervising Engineers will take note of Consultants, Contractors and sub-contractors that produce quality work, in line with their contracts and industry best practice. III. Unskilled labourers taken on from the local communities surrounding the drainage channels will be kept on for maintenance works of the channel, where possible.
7.4.2.2	Risks to Community Health and Safety The channel designs propose the widening and deepening of the existing channels in the Project area. While this will improve the hydraulics of the infrastructure and result in better conveyance of storm water with a significant reduction in the occurrence of flooding, there is an increased risk to community safety.	I. The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. II. Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels. III. Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
7.5.1	Bio-physical Environment - Positive Impacts	
7.5.1.1	Restoration and Protection of Wetlands The widening of the existing channel width will require land take, and as such a RAP study was undertaken. This study also helped to identify the number of people that are currently living within areas that were once wetlands. The compensation process for this Project will provide an alternative for people living in the wetlands to leave and settle in areas less prone to flooding.	I. The extent of wetlands will be clearly demarcated by beacons to mark the wetlands buffer zone. II. A wetlands restoration programme will be embarked upon, starting with the major wetlands in the City. III. The Project monitoring Programme will include an annual assessment of the functionality of wetlands, and in this way a status of the wetland restoration exercise. V. KCCA will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the drainage channels in this Project will have an impact on the downstream receiving bodies.
7.5.2	Bio-physical Environment - Negative Impacts	
7.5.2.1	Air Pollution Exhaust emissions from the trucks loading away the silt and garbage dredged out of the channels will be an impact felt by the communities along the channels.	I. The vehicles will be switched off when not in use to minimize the release of fugitive emissions; II. The vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimise potential emissions. III. Trucks carrying away the dredged silt and garbage from the channels will drive at reduced speed, especially in busy residential and commercial areas, to avoid spillage of the silt and garbage onto roads; IV. Heaps of the garbage and silt from the channel will not be piled near the channels since this is a potential source of dust in dry seasons; V. Vegetation clearing along the channels will be limited to the minimum required so as to minimise exposed areas and vegetation removal; VI. There will be no open burning of waste from the channels as is being currently done.
7.5.2.2	Disturbance due to Noise Pollution and Vibrations Vehicles and machinery used during maintenance works will generate noise and vibrations. Such noise will cause disturbance in the Project area. Some sections of channels are located near schools and health centres and maintenance activities occurring during school term can contribute	I. The Contractors and workers should be especially mindful when carrying out construction near sensitive receptors such as schools, clinics and places of worship. II. Maintenance activities will be limited to daytime, especially in residential areas to minimize disturbance of residents. III. Regular care and maintenance of vehicles and equipment must be undertaken to ensure they run smoothly so as to minimize emissions of noise. IV. Project machines and vehicles will be turned off

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
	to interruption of the school activities and disturbance of patients in clinics and health centres.	when not in use.
7.5.2.3	Improper Management of Waste from Channel maintenance Waste during the O&M phase will be generated as a result of dredging of silt and garbage from channel cleaning. Slashing of grass and nearby shrubs will also be a source of waste. Improper management of this waste could have adverse impacts on the environment, resulting in soil and garbage near the channels.	I. A waste management plan will be developed by the Maintenance Contractors, and approved by KCCA to ensure that measures for handling all Project-generated waste are in place. Waste collected downstream of industries of areas identified to be 'at risk of having hazardous waste' should have their silt testes, and if found to be hazardous, disposed of in an appropriate manner by a licenced hazardous waste handler. II. The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle. III. Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage. IV. Waste collected from the channels shall not be left in stockpiles along roads, but removed and reused or disposed of on a regular basis.
7.5.2.4	Impact on water resources and receiving habitat Improved drainage channels result in increased efficiency of conveyance for stormwater from the respective catchments. Changes in hydraulic efficiency of storm water collection systems with improved channels increase the velocity of flow. Although this is the primary benefit of the Project, it also has the implication of increased potential for the channels to transport sediment and garbage into the receiving wetlands. This reduces the effectiveness of the wetlands to undertake their functions, including the critical one of water quality improvement before the storm water finally joins the open water bodies.	I. The quantity and quality of stormwater reaching the channels must be reduced within the catchment. Implementation of an integrated catchment management plan (ICMP) would be an effective undertaking. Thus KCCA will implement an ICMP that includes: – Encouraging rainwater harvesting: temporary storage of excess runoff so that release of runoff from properties during a storm is controlled. This will be done by development of guidelines to encourage rainwater harvesting, particularly for new construction projects in the City. – Greening of yards/compounds rather than paving by impervious surfaces. – Promoting water use efficiency. – Improved sanitation systems. – Upgrading tertiary drainages and community accesses. – The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle. – Strict demarcation and protection existing wetlands in Kampala City. – Provisions to be made for floodplain zoning

Ref. No.	Potential Impact	Enhancement / Mitigation Measures
		and regulation for land use changes – some areas will be prohibited for developments and left out for flood control. – Provisions to be made for development of a compatible and coordinated storm water drainage system in Kampala City. II. The designed channel corridors need to be protected from encroachment. III. The channels must be regularly and adequately maintained – including replacement of damaged lining, vegetation clearing, de-silting, garbage/debris removal and dredging. IV. KCCA will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the drainage channels in this Project will have an impact on the downstream receiving bodies. In particular KCCA will: – Tailor any developments in the City in line with the existing wetland management plans and in close consultation wit NEMA and WMD. – Consult WMD and NEMA before approving any developments in demarcated and non-demarcated wetlands. Close cnd indiscriminate application of a stringent system of approval will greatly minimize the loss of wetlands to developers. – Partner with the NEMA and WMD on regular sensitization of people in Kampala on the benefits of protecting natural wetland systems, and the dangers of destroying the same. – Partner with the NEMA, WMD and in effect the Environmental Police attached to these Institutios to regularly monitor the demarcated sections of wetland so as to dissuade encroachment on wetlands. Since KCCA has a presence in most parts of the City, with the Divisions, Councils and Villahe leadership, it is possible to closely monitor any new developments in wetlands before serious damage is done.

012. Cumulative Impacts

The proposed project will potentially result in an additive effect for some of the impacts. Cumulative impacts are socio-economic and environment effects which result from incremental impact of the project when added to other past, present, and reasonably foreseeable future actions.

Cumulative impacts will be contributed by those projects within Kampala city whose development activities overlap both spatially and temporary with this Project. Such projects will include routine city infrastructure maintenance, other projects within KIIDP Phase 2, national infrastructure development projects (for example the Northern Bypass, Entebbe Express Way, Southern Bypass, and Standard Gauge Railway) and other private projects.

The assessed cumulative impacts associated with past, proposed and foreseeable future activities in the project area include;

- Community impacts including in-migration and increased demand for services and resources
- Impact on project access roads
- Water resources impacts (both quality and quantity)
- Noise, vibration and air quality impacts
- Increased pressure and conversion of the city wetlands
- Employment and contribution to economic growth
- Increased traffic congestion especially at drainage road crossings.

These impacts are predicted on the premise that future developments will actually take place in the City. Considering that some the planned projects will be implemented by different institutions, the scheduling cannot be ascertained.

Mitigation measures

i) All projects to be developed must undertake indvidual ESIA studies that must be approved by NEMA and strictly follow the approval conditions.

ii) KCCA must provide for strict enforcement of approval requirements before projects are implemented.

iii) Synchronised project development schedules especially for projects within the jurisdiction of one agency with a goal of minimising spatial and temporal overlap of projects' impacts on the environmnet will be followed.

013. Environmental and Social Management and Monitoring Plan

The Environmental and Social Management and Monitoring Plan (ESMMP) for the pre-construction, construction and post-construction (operation and maintenance) phases of the Project includes details such as the issue to monitor, the indicators, responsibility for collecting and checking data and reporting, costs of implementation (where applicable), responsibility for implementing the action and training or orientation of responsible person (if applicable).

The purpose of developing the ESMMP is to guide the implementation of enhancement measures for potential positive impacts, and mitigation measures to remove, reduce or offset the identified potential negative impacts that could occur as a result of project implementation. All Project personnel have a responsibility for their own environmental performance and compliance with the direction of the ESMMP and national environmental legislation.

Key objectives of the ESMMP are to:

- Facilitate compliance with applicable acts, regulations and guidelines;
- Recognize that social responsibility and environmental management are among the highest corporate priorities;
- Assign clear accountability and responsibility for environmental protection and social responsibility to management and employees;

- Facilitate environmental and social planning through the project life cycle;
- Provide a process for achieving targeted performance levels;
- Provide appropriate and sufficient resources, including training, to achieve targeted performance levels on an on-going basis; and
- Evaluate environmental performance and social responsibility against KCCA's environmental and other policies, objectives and targets and seek improvement where appropriate.

A. Monitoring and Reporting Arrangements

Monitoring will verify if predicted impacts have actually occurred and check that mitigation actions recommended in the ESIA are implemented and their effectiveness regularly monitored. Monitoring will also identify any unforeseen impacts that might arise from project implementation.

a) Who monitors and how

Monitoring will be undertaken by KCCA and Environmental Officers who represent NEMA at local administrative level. Monitoring by NEMA in this case can be considered "third party monitoring" but this is its regulatory mandate according to Sections 6 and 7 of the National Environment Act (Cap 135). Considering that sectiosn of the Project route are within wetlands, or will affect wetlands that are downstream of the Project area, the Wetlands Management Department (WMD) will also be involved in Project monitoring.

Another government agency that may undertake "third party monitoring" is the Occupational Health & Safety Department in the Ministry of Gender, Labour & Social Development (MGLSD). This unit has authority to inspect any facility for compliance with national requirements on safety in workplaces. The project shall make no funding to MGLSD since this is provided for in its annual budget.

Monitoring will be done through site inspection, review of grievances logged by stakeholders and *ad hoc* discussions with potentially affected persons (construction workers, residents near the drainage channels or along the access roads used by Project vehicles). At each monitoring, a discussion with a chairperson of environment committee of the area's local council (LC) could provide insight into views and grievances the community has about the project.

b) Frequency of monitoring

Monitoring frequencies vary between the responsible agencies, with some effectively carrying out monitoring activities monthly over the construction period.

c) Audits

Audits will be necessary both during construction and project operation. While construction audits will aim to verify compliance to impact mitigation requirements, post-construction audits are a regulatory requirement within 12 months and not more than 36 months after completion of construction, according to national EIA Regulations, 1998 Section 31(2). Both construction and post-construction audits can be conducted internally (by KCCA) or by a consultant hired by KCCA.

d) Reporting

Concise monthly monitoring reports should be compiled by KCCA and shared with any interested stakeholder.

Construction and post-construction phase auditing should culminate in reports that KCCA shall share with World Bank (the Development Partner, NEMA or other interested stakeholders. Note that while KCCA is under no obligation to disclose construction phase audits, annual post-construction audits must be submitted to NEMA as a regulatory requirement as per Section 31(2) of National EIA Regulations, 1998.

Responsibility of KCCA

As the developer, KCCA will play a major role in ensuring the ESMMP is implemented. KCCA will assume the responsibility for ensuring that the environmental management measures contained in this programme are implemented during the pre-construction, construction and post –construction (operation and maintenance) phases of the project. Specifically, KCCA will ensure that:

- There is minimum disruption to the lives of local residents within the Project area.
- The requirements for environmental and social safeguards, as provided for in ESMMP are integrated into the bidding documents to ensure that the the Contractors adequately prepare to include these in their schedules during Project implementation.
- On appointment, all Consulting and Contracting companies operating on project sites receive a copy of the relevant Project EMPs, as well as the NEMA Approval and various permit conditions.
- Independent environmental experts are appointed to audit the implementation of, and compliance with, the ESMMP and monitoring plan, as well as the NEMA Approval conditions on an annual basis; and the independent environmental audits, together with other relevant monitoring information, are made available to the public, throughout the life of the project, summarized in lay person's terms and in a culturally accessible manner.
- A formal senior management review of environmental management performance is undertaken on a monthly basis for the first one year, and quarterly basis throughout lifespan of the project. Senior management responsibility will include the review and approval of any proposed measures to improve environmental performance.
- Training and awareness creation in environmental and social management and the mitigation of impacts are provided to KCCA Project staff, to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally and socially responsible manner.
- The site and activity managers notify the Environmental, Health and Safety (EHS) Manager immediately when environmental or health and safety incidents occur. If the breach is a part of a permit or license condition, the EHS Manager will inform the responsible authority within 48 hours.
- There is availability of the human and financial resources needed to conduct all environmental management, mitigation and monitoring activities throughout the pre-construction, construction and post-construction (operation and maintenance) phases. As necessary, but primarily during construction, this will include the investment of capital to ensure that environmental mitigation measures such as pollution control equipment are integrated into various project components.
- KCCA will include provisions for a mechanisms for enforcing compliance not limited to the above mentioned requirements in both Consultant and Contractor contracts.

Responsibility of the Construction Supervision Consultant

The Supervision Consultants to whom work is outsourced during project implementation will be subjected to the following responsibilities:

- Review project design, contractor's contract, BOQ and all other project documents such as the ESMMP, ESIA report, NEMA project certificate conditions, RAP as to familiarize with as to build up an additional mechanism for enforcing compliance as per those in contract.
- The Supervising Consultant will ensure that contractors familiarize themselves with the environmental and social management framework for the project sites and activities.
- Review and approve Contractor's plans as required in the above documents such as EHS Plans, Waste Management Plan, Traffic Management Plan, Emergency Response Plan, Gender Management Plan, Erosion and sediment control plan, Decommissioning and Restoration Plans of different sites; among others.
- Follow up on Contractor's obligations in acquiring the various permits in relation to the project works which then will be verified such as; Surface Water abstraction permit, Wetland use permit, Permit for demolition of existing structures, Permit for excavation, Permit for hoarding and scaffolding, Work registration permit.
- Monitor the Contractor's performance in EHS aspects, particularly in regards to the above mentioned plans; using the safeguards documents provided by KCCA and NEMA, as well as permits from other Lead Agencies, using the safeguards documents provided by KCCA and NEMA, as well as permits from other Lead Agencies.
- Ensure that all contractors and their subcontractors receive basic training or are sensitized on environmental and social matters, including acceptable conduct, storage and handling of potentially hazardous substances, waste management, and prevention of pollution of natural resources.
- Receive daily, weekly and monthly reports from the Contractor on EHS aspects, and furnish KCCA with the information during monthly meetings or site visits. Any urgent issues will have to be reported to KCCA immediately to allow appropriate timely action to be implemented.
- Prepare the environmental supervision statement and also approval of invoices or payments with consideration of EMP performance.
- Regular engagements with the local communities to ensure continued social acceptance in the areas where the Contractor is in operation, and also to ensure that Contractor adheres to the recommendations made in this ESMMP.
- In case of any corrective actions, instruct the contractor to correct within the timeframe determined as per contract. If there is breach of contract or strong public complaints on contractors environmental performance, the Supervision Consultants is obligated order contractor to correct, change or stop the work, reporting to relevant agencies and the KCCA;

Responsibility of Contractors

Contractors to whom work is outsourced during project implementation will be subjected to the following responsibilities:

- All contracting companies will receive a copy of the Project design, BOQ, ESMMP, ESMF, RPF, ESIA, NEMA Approval Conditions, and RAP and any other relevant documents citied out in the contracts contract as to familiarize with as to build up an additional mechanism of compliance.
- Develop their own contractor's ESMMP and EHS Plans, including among others, Waste

Management Plan, Traffic Management Plan, Emergency Response Plan, Gender Management Plan, Erosion and sediment control plan, Decommissioning and Restoration Plans of different sites and OSH Policy.

- Acquire the various permits in relation to the project works like; Surface Water abstraction permit from DWRM, Wetland use permit from NEMA, Permit for demolition of existing structures, Permit for excavation, Permit for hoarding and scaffolding from KCCA, Work registration permit from OHS, among others
- Prepare daily, weekly and monthly reports on EHS aspects, and furnish the supervising consultant with the information during wekkly and monthly meetings or site visits.
- Ensure that all contractors' workers including those of the subcontractors receive appropriate training on environmental and social matters, including acceptable conduct, storage and handling of potentially hazardous substances, waste management, and prevention of pollution of natural resources. Training given will be facilitated by the contractor (basing on the BOQ training cost) through the EHS Manager and all staff will be made aware of where detailed information relating to any aspect of the ESMMP or environmental and social requirements can be obtained.
- Regular engagements with the local communities to ensure continued social acceptance in the project scheduled work areas.
- It is the responsibility of the contractor to bring to the attention of the Construction Supervision Consultant and KCCA, through the EHS Manager, any environmental incident or breach of the conditions of the ESMMP, immediately for severe incidents or within 8 hours of minor incidents.

Responsibilities of Lead Agencies

Agencies such as NEMA, WMD, MGLSD, Office of CGV, will be involved in the various phases through the life of the Project as proposed in the ESMMP. The responsibilities of each respective agency will be those that are within their mandate, and as such, no extra costing has been included in the ESMMP since it is expected that their annual operational budgets will be made to include the required works for this Project. For this reason, KCCA should regularly update the respective lead agencies with the Project progress, and challenges and opportunities presented. Some of the responsibilities will include:

- NEMA
  - Review ESIA and recommend conditions that will have to be fulfilled to ensure Project success and sustainability.
  - Adherence to national standards for air quality, noise, waste disposal, and others regarding environmental protection.
- WMD
  - All matters regarding wetland protection and restoration.
- MGLSD
  - All matters regarding community, public and occupational health and safety.
- Office of CGV
  - All matters regarding resettlement and compensation as required by the Project.

B. Review and Improvement of ESMMP

The Project Operations Manager, together with the Project EHS Manager will review the ESMMP, its operation and effective implementation at least once every three months to ensure that it is still applicable to the existing risks. Between the scheduled reviews, a register of issues will be maintained to ensure that issues raised by internal or external personnel associated with the Project is recorded.

The purpose of the review is to ensure that the ESMMP is meeting the requirements of the standards, policies and objectives and if not, to amend the ESMMP to address any short comings. The review will consider:

i) Site personnel comments;
ii) Audit findings;
iii) Environmental monitoring records;
iv) Community complaints;
v) Details of corrective and preventative actions taken;
vi) Incident reports;
vii) Changes in organization structures and responsibilities;
viii) The extent of compliance with objectives and targets; and
ix) The effect of changes made to environmental standards and/or legislation.

Acting on the findings of the review, the Project Operations Manager together with the Environment and Safeguards Team will review the various policies and objectives and approve any changes.

014. Conclusion

The proposed project is aimed at improvement of priority drainage systems in Kampala Capital City, and is part of the second phase of the Kampala Institutional and Infrastructure Development Project (KIIDP). The Project addresses the flooding problem in the City by improvement of three (03) of the eight (08) drainage systems in the City and their secondary channels. This study has identified and described positive and negative impacts that will result from the project development activities. Enhancement measures for the positive impacts and mitigations for the negative impacts have been provided taking into consideration of the feedback from stakeholders' consultations.

Integrated waste management was noted to be a critical requirement for optimum operation of the drainage system, but also for the effectiveness of the mitigation measures. Thus intra-KCCA departmental coordination and inter-institutional cooperation between KCCA and relevant agencies including NEMA, WMD, DWRM, MGLSD and NWSC will be required during project implementation.

If the project is developed and the infrastructure put in place, is operated in conformity with the legal requirements, enhancement measures and mitigations adequately managed as per the ESMP and annual audits conducted as per the regulatory requirements, the benefits of this project to Kampala City would by far outweigh potential negative effects. It should however, be noted that the costs indicated in the ESMMP are indicative only and the responsible implementing parties such as Contractors, Supervising Consultants, and respective KCCA teams should prepare budgets to include the aspects covered in this ESMMP.

1 INTRODUCTION

1.1 Background

This project is aimed at improvement of priority drainage systems in Kampala Capital City, and is part of the second phase of the Kampala Institutional and Infrastructure Development Project (KIIDP), among other KCCA infrastructure development projects. The financing for both this second phase and the first phase is from The World Bank and is meant to address the institutional and infrastructure challenges of Kampala City. Phase 1 of the project carried out improvements of various city infrastructures and also addressed key institutional bottlenecks including the restructuring of city administration. The overall Project Development Objective of Phase 2 of KIIDP is to enhance city infrastructure to improve urban mobility and deepen the institutional reforms for economic growth.

Under the KCCA Infrastructure development component, the Phase 2 of KIIDP will seek to construct and upgrade identified roads and junctions and drainage channels that are central to enhancing mobility and reducing flooding thereby increasing the useful life of city infrastructure. Interventions in infrastructure improvement will seek to construct and upgrade identified roads and junctions and drainage channels that are central to enhancing mobility and reducing flooding thereby increasing the useful life of city infrastructure. These interventions by KCCA, in some instances, will be conducted in the same geographical area as some sections of the priority drainage channels in this project and therefore have a tie-in with its implementation.

Other infrastructure developments planned in Kampala Capital City include the Southern Bypass, Northern Bypass expansion, Kampala-Jinja Expressway by Uganda National Roads Authority (UNRA) and the Standard Gauge Railway. These proposed development projects interact in a number of ways with this priority drainage improvement project.

The Consultants, SMEC International Pty Ltd, Australia, (SMEC), have prepared this comprehensive Environmental Impact and Social Assessment (ESIA) for the proposed Improvement of Priority Drainage Systems in Kampala Capital City (the Project). In addition, a Resettlement Action Plan (RAP) has been prepared for the project and compiled in separate report.

This Project is categorized under the Third Schedule of the National Environment Act within Section (4) Dams, rivers and water resources as (b) river diversions and water transfer between catchments; (c) flood-control schemes. The World Bank EIA Guidelines (World Bank, 1999) categorize the proposed project as a Category B project. Both the national legislation and international guidelines therefore recommend that a full ESIA be conducted for the proposed Project prior to implementation.

1.2 Objectives of the ESIA

The objective of the ESIA was to influence the emerging project design in consideration of the the environmental and social baseline conditions and issues as identified in the proposed Project area.

Specifically, the study aimed to:

i) Conduct baseline environmental investigations along the Project channel routes;
ii) Conduct consultations with relevant stakeholders, including potentially affected persons, to obtain their views and suggestions regarding the environmental and social impacts of the proposed project;
iii) Propose mitigation measures to address potential negative impacts; and
iv) Prepare an Environmental and Social Management and Monitoring Plan (ESMMP) to guide the implementation of the recommended enhancement and mitigation measures.

The study considered the impacts of the project on the following aspects of the bio-physical, social, economic, and cultural environment:

- Flora and fauna
- Soils
- Water quality and hydrology
- Land use and planning
- Air quality
- Noise and vibrations
- Utilities and service systems
- Public health and safety
- Occupational health and safety
- Transportation and traffic
- Economic activities
- Physical Cultural Resources

1.3 Project Justification

The drainage of Kampala is mainly through eight (08) primary channels served by numerous secondary and tertiary systems. Human settlements and industrial developments are extending from the many hills to the low lying areas on the banks of the drainage channels which are part of wetlands and floodplains. The natural and manmade drainage channels along the floodplains and low-lying areas are regularly overtopped by floodwaters, causing damage to people's homes and industrial properties, seriously disrupting traffic flow and economic activity in the City and increasing water pollution. The frequency of flooding has increased due to increased runoff caused by land-use changes in the catchments and reduction of the buffer capacity of wetlands due to encroachment. All this results in loss of lives, destruction of livelihoods, and recurring costs to Kampala's infrastructure development. Investment in upgrading drainage infrastructure is required to protect people and their property and also spur economic development.

This project aims to improve three (03) of the eight (08) drainage systems in the city i.e. Lubigi (System 2), Kansanga and Gaba (System 4 and 4A), and Kinawataka (System 6) in order to resolve the problem areas along these systems such as risk of flooding, and lack of accessibility for channel maintenance.

1.4 Project Scope

This project will involve the improvement of three Primary drainage channels in Kampala Capital City. Table 1-1 shows the lengths of the primary and secondary channels that will be improved as part of this Project.

Table 1-1: Drainage Systems included in Assignment

Drainage System	Order of drain(s)	Number of Channels and Length (km)		
		No. of Channels	Primary	Secondary
System 2 - Lubigi	Primary – Upper and Lower reaches	1	2.5	
System 2 - Lubigi	Secondary	10		31.99
System 4 and 4A – Kansanga and Gaba[1]	Primary	1	7.16	
System 4 and 4A – Kansanga and Gaba	Secondary	4		8.45
System 6 - Kinawataka	Primary	1	4.42	
System 6 - Kinawataka	Secondary	4		9.3
Total Length			**14.08**	

[1] System 4 and 4A – Kansanga and Gaba[1] consist of the linked Kansanga and Gabba channels whereby Gabba covers 1.78km whereas Kasanga covers 5.83km lengths

1.5 Report Structure

This report provides baseline information and outline of potential environmental and social impacts of the project as required by national ESIA guidelines. The remainder of this report is laid out as follows:

- Section 2 – Description of the Proposed Project;
- Section 3 – Presentation of the ESIA Methodology used for this study;
- Section 4 – Review of relevant national laws and international policies and safeguard guidelines;
- Section 5 – Environmental and Socio-Economic Conditions of the Baseline Environment;
- Section 6 – Stakeholder Engagement and Public Consultations;
- Section 7 – Identification and Assessment of Impacts;
- Section 8 – Environmental and Social Management Plan;
- References; and
- Appendices

1.6 Terms of Reference

A scoping study was undertaken to identify the important issues to be examined in detail during the ESIA, and thus to develop the terms of reference (TOR) for the ESIA. These TOR (Appendix A) were subsequently approved by NEMA following consultation with lead agencies.

1.7 Project Proponent and Cost

Name and address: Kampala Capital City Authority

Plot 1-3 Apollo Kaggwa Road

P.O. Box 7010, Kampala, UGANDA

Tel.: 0414 581 294 /0204 660 000

Website: www.kcca.go.ug

Contact Person: Charles Tumwebaze

Co-ordinator, KDIIP II Project

Email: ctumwebaza@kcca.go.ug

The Project is estimated to cost USD 93,014,897 for the entire Project. Table 1-2 shows the summary of the costs, including those for each of the drainage systems within the Project.

Table 1-2: Summary of cost for each Drainage System in the Project

Drainage System	Length (km)	Bill No. 1 GENERAL ($)	Bill No. 2 DRAINAGE ($)	Bill No. 3 EARTH WORKS ($)	Bill No. 4 LANDSCAPING ($)	DEVELOP COSTS ($ per km)	ANNUAL MAINTENANCE ($)	TOTAL ($)
Lubigi	2.5	1,122,601	37,981,888	325,217	6,698,820	1,216,936	150,162	**47,495,624**
Kansanga and Gaba	7.16	1,122,601	10,501,186	94,658	2,384,734	1,318,219	116,351	**15,537,749**
Kinawataka	4.42	1,122,601	23,730,588	130,643	2,675,545	2,093,957	228,190	**29,981,524**
TOTAL	**14.08**	**3,367,803**	**72,213,662**	**550,518**	**11,759,099**	**4,629,112**	**494,703**	**93,014,897**

2 PROJECT DESCRIPTION

Kampala is drained by eight (08) major/primary channels, which are fed by numerous secondary, tertiary, and quaternary channels of varying capacity. The lower lying areas of the City are usually inundated in the event of heavy rains, with the residents and road users in such flooded areas suffering during the after-effects of floods. This Project aims to address the flooding problem in the City by improvement of three (03) of the eight (08) drainage systems in the City and their secondary channels.

The eight primary channels that drain the City are listed in Table 2-1 and illustrated in Map 2-1. This Project will involve improvement of Primary Channels 2, 4 & 4A, and 6, including the secondary channels that drain into them.

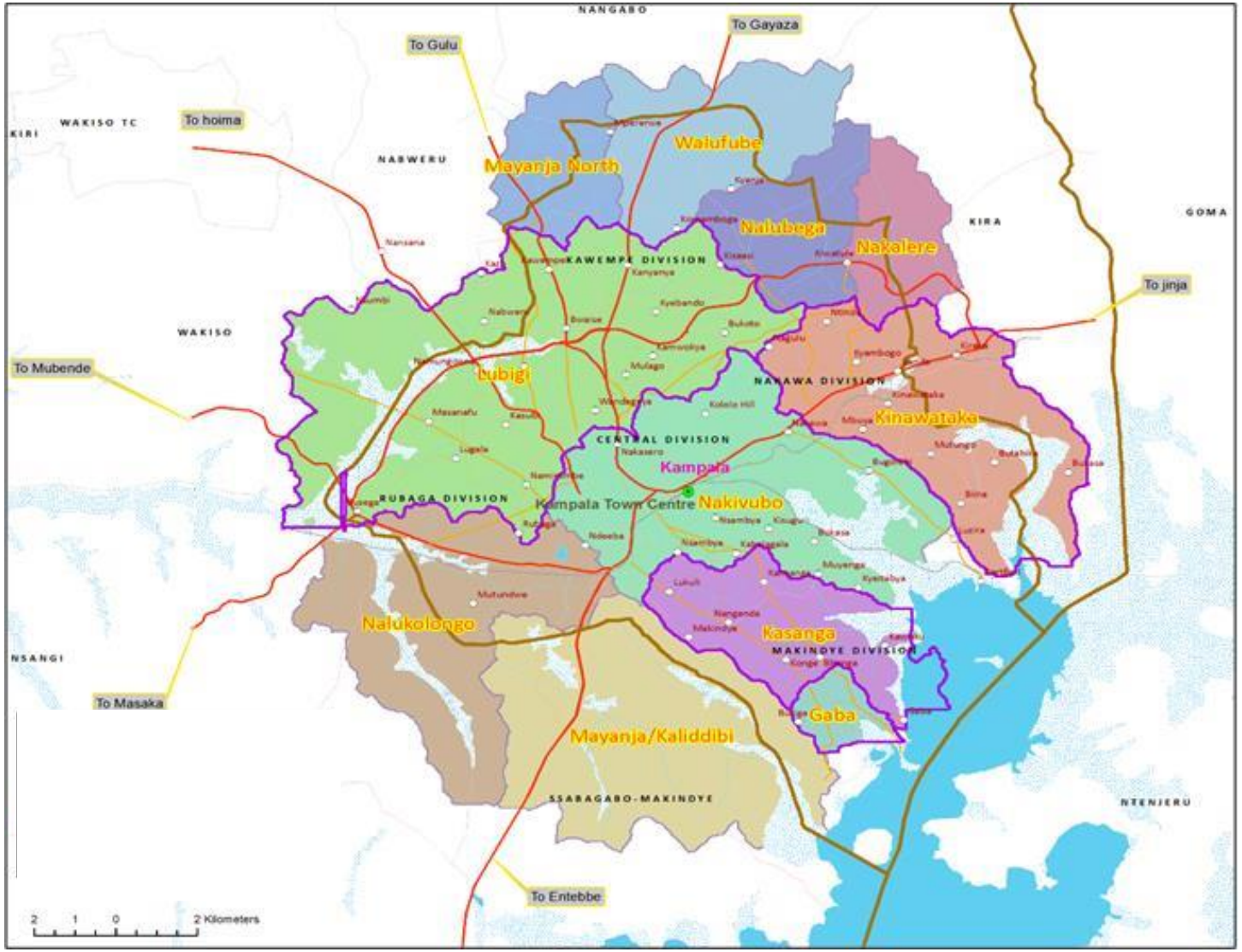
Table 2-1: Primary drainage channels in Kampala City

System 1:	Nakivubo	System 6:	Kinawataka
System 2:	Lubigi	System 7:	Nalubaga
System 3:	Nalukolongo	System 7A:	Nakelere / Nalubaga
System 4:	Kansanga	System 8:	Walufumbe
System 4A:	Gaba	System 8A:	Mayanja North
System 5:	Mayanja / Kaliddubi		

2.1 Project Components

The following is an outline of the activities to be undertaken as part of the project:

i) Ensuring that the necessary permits are issued;
ii) Incorporation of the ESIA findings and recommendations in the final design of the drainage systems;
iii) Continuation of social sensitisation processes initiated during the ESIA process, to garner the support of the local communities along the channels to be improved and District leadership;
iv) Establishment of site office and staff welfare facilities, and mobilisation of construction equipment to suitable locations as per the construction schedule;
v) Mobilisation of construction personnel;
vi) Management of controlled channel flow during construction;
vii) Construction of the drainage system;
viii) Management of waste materials including construction debris, dredged waste and pit latrine sludge; and,
ix) Operation and maintenance of the improved channels.



Map 2-1: Kampala City Drainage System

2.2 Project Location

The channels to be improved in this project traverse the four divisions of Kawempe, Lubaga, Makindye and Nakawa. The locations in the Project area by Division, Zone and Parish, are listed in Table 2-2. Map 2-2 shows the relative location of each drainage area within Kampala District.

Table 2-2: Location of the Lubigi Catchment Project Area (Division, Parish and Zone)

Primary System 2 - Lubigi			
Drainage System	Division	Parishes	Village/zone
Primary: Start to Sec 10 up to Bombo Road	Nakawa	Bukoto I	• Old Kira Road • Mulimira
	Central		• Kisenyi I • Church • Kisenyi II
	Kawempe	Kyebando	• Kisalosalo • Nsooba
		Mulago III	• Kifumbira • East Nsooba • Lower Nsooba
		Makerere III	• Kibe • Mayinja • Kalimali • Kiggundu
		Bwaise III	• Bugalani • Bukasa
	Lubaga	Kasubi	• Kawaala Road • Katoogo • Kawaala II
Sec 01	Lubaga	Busega	• Kigwanya
Sec 02	Lubaga	Busega	• Kabaale
Sec 03	Lubaga	Busega	• Kibumbiro B • Nabisasiro
		Lubya	• Masanafu Bukulugi • Lugala • Lusaze • Nabulagala
		Lungujja	• Zone 8 • Sendaula • Kikandwa • Bulange A • Bulange B
Sec 04	Lubaga	Lubya	• Masanafu Kinoonya • Namungoona I • Namungoona II
Sec 05	Lubaga	Kasubi	• Namungoona • Kawaala II • Kasubi III • Mugema

Sec 06	Lubaga	Kasubi	• Kawaala I • Kasubi I • Kasuubi II
		Nakulabye	• Zone VII • Zone IX
	Kawempe	Makerere II	• Zone A • Zone B • Zone C
Sec 07	Kawempe	Bwaise III	• Bokasa • Bugalani
		Bwaise II	• Jambula • Lufula • Nabukalu • Nakamiro
		Kazo Angola	• Corner • Kazo-Angola Central • Lugoba
Sec 08	Kawempe	Makerere III	• Kiggundu • Good Hope • Sebina • Dobbi
		Makerere I	• Mini Triangle
		Mulago II	• Triangle • Kiwonvu • Kafeero
		Wandegeya	• Busia • Kimwanyi
Sec 09	Kawempe	Kawempe I	• Kakungulu
		Kyebando	• Lutunda • Kanyanya Quarters • Erisa • Nsooba
		Muluka I	• Katale
		Kikaaya	• Kikaya A • Kikaya B • Wampamba • Ddungu
		Bwaise I	• Kisenyi
Sec 10	Kawempe	Kyebando	• Kisalosalo
	Nakawa	Bukoto I	• Mulimira • Semwogerere • Katende A • Katende B
Sec 10A	Kawempe	• Kikaaya	• Kisota • Kikulu • Kikaaya B • Butukirwa

Table 2-3: Location of the Kansanga and Gaba Catchment Project Area (Division, Parish and Zone)

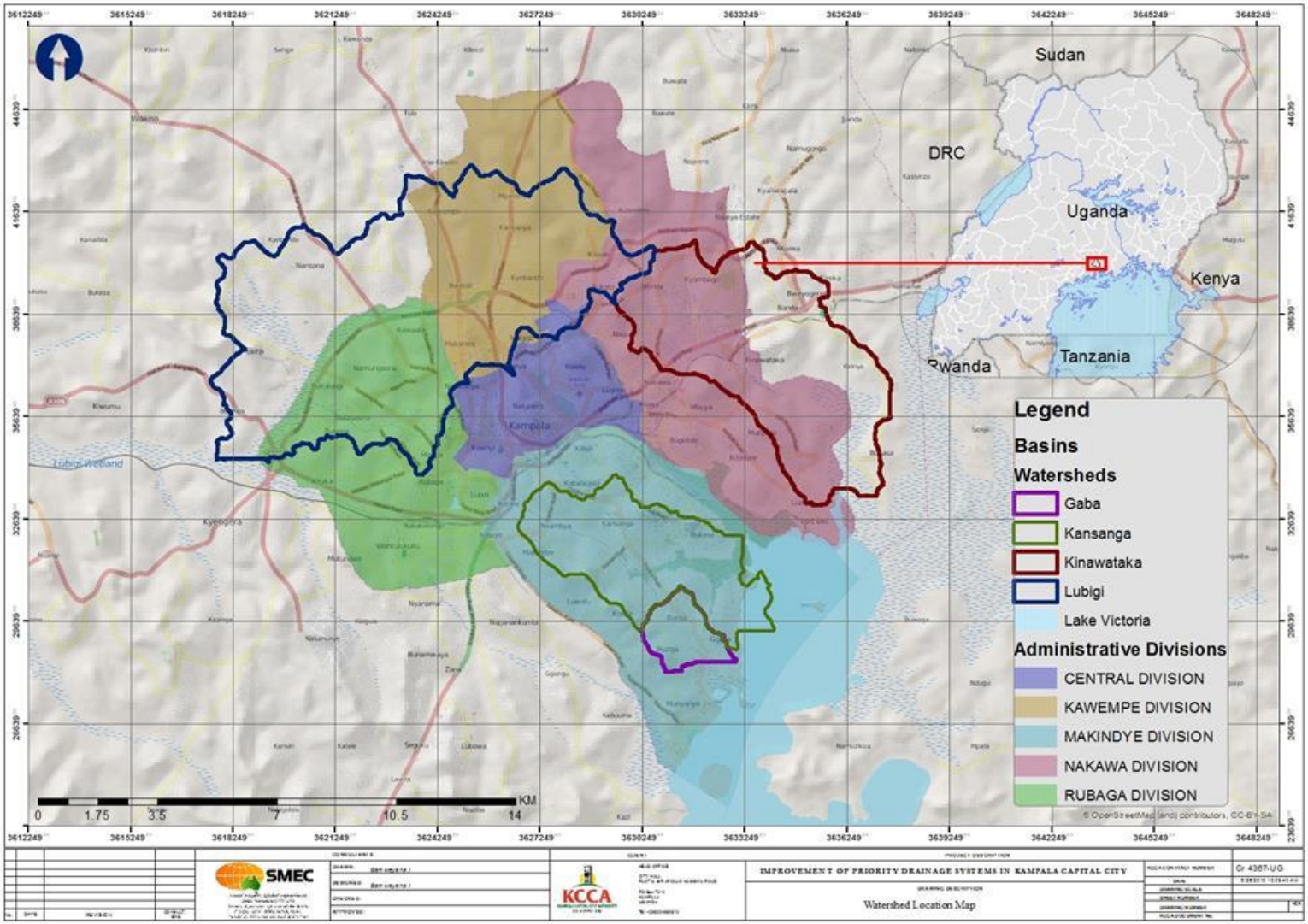
Primary System 4 – Kansanga			
Drainage System	Division	Parishes	Village/zone
Primary Channel	Makindye	Kibuye I	• Nkere • Lusaka • Nabisalu
		Nsambya Central	• Nsambya West • Gogonya I • Gogonya II • St. Augustine
		Makindye I	• Kirombe
		Lukuli	• Tyaba • Kalule • Lower Konge
		Kansanga-Muyenga	• Nabutiti • Ssebuliba • Masaana • Wheeling • Mutesasira • Kiwafu • Heritage • Kiggundu
		Ggaba	• Bunga Hill • Kalungu
		Bukasa	• Kyeitabya • Yooka • Kanyogoga
Sec 01	Makindye	Lukuli	• Lower Konge
		Ggaba	• Bunga Hill
Sec 02	Makindye	Kabalagala	• Pantaleo
		Kansanga-Muyenga	• Katabu • Nabutiti
		Nsambya Central	• Gogonya II
Sec 03	Makindye	Makindye I	• Katimbo • Kirombe • Water Pump
Sec 04	Makindye	Bukasa	• Kawuku • Kyeitabya • Kalungu
Sec 05	Makindye	Bukasa	• Kyeitabya
		Kabalagala	• Kiwafu • Heritage
Primary System 4A – Gaba			

	Makindye	Buziga	• Katuso-Buziga • Kiruddu-Buziga
		Ggaba	• Bunga Trading • Ggaba Mission

Table 2-4: Location of the Kinawataka Catchment Project Area (Division, Parish and Zone)

Primary System 6 – Kinawataka			
Drainage System	Division	Parishes	Village/zone
Primary channel	Nakawa	Bukoto II	• Buyinja • Central • Karerwe • Kaggo • Kinawataka
		Kyambogo	• K10
		Banda	• B1
		Mutungo	• Zone I • Zone III • Zone IV
	Namugongo Division, Kira Municipal Council	Kireka	• Kireka D
		Kireka	• Kasokoso
		Kirinya	• Kito
Sec 01	Nakawa	Mutungo	• Zone IV • Zone V
		Butabika	• Butabika • Kirombe Zone B
Sec 02	Nakawa	Banda	• B11 • B10 • B9 • B4 • B3 • B2
	Namugongo Division, Kira Municipal Council	Kireka	• Kireka A • Kireka C • Kamuli A • Kamuli C
Sec 03	Nakawa	Kyambogo	• K2 • K4 • K10
		Banda	• B2
Sec 04	Nakawa	Kiwatule	• Ssebowa
		Mbuya I	• Kinawataka • Kaggo
		Ntinda	• Village 1 • Village 14 • Village 15

		U.P.K	• Unise • K12 • K18
		Kyambogo	• K9
Sec 04A	Nakawa	Ntinda	• Village 19 • Village 3 • Village 4 • Village 14 • Village 15 • Village 16 • Village 17
		Naguru II	• Regional Flats • Naguru Hill



Map 2-2: Project location within Kampala District

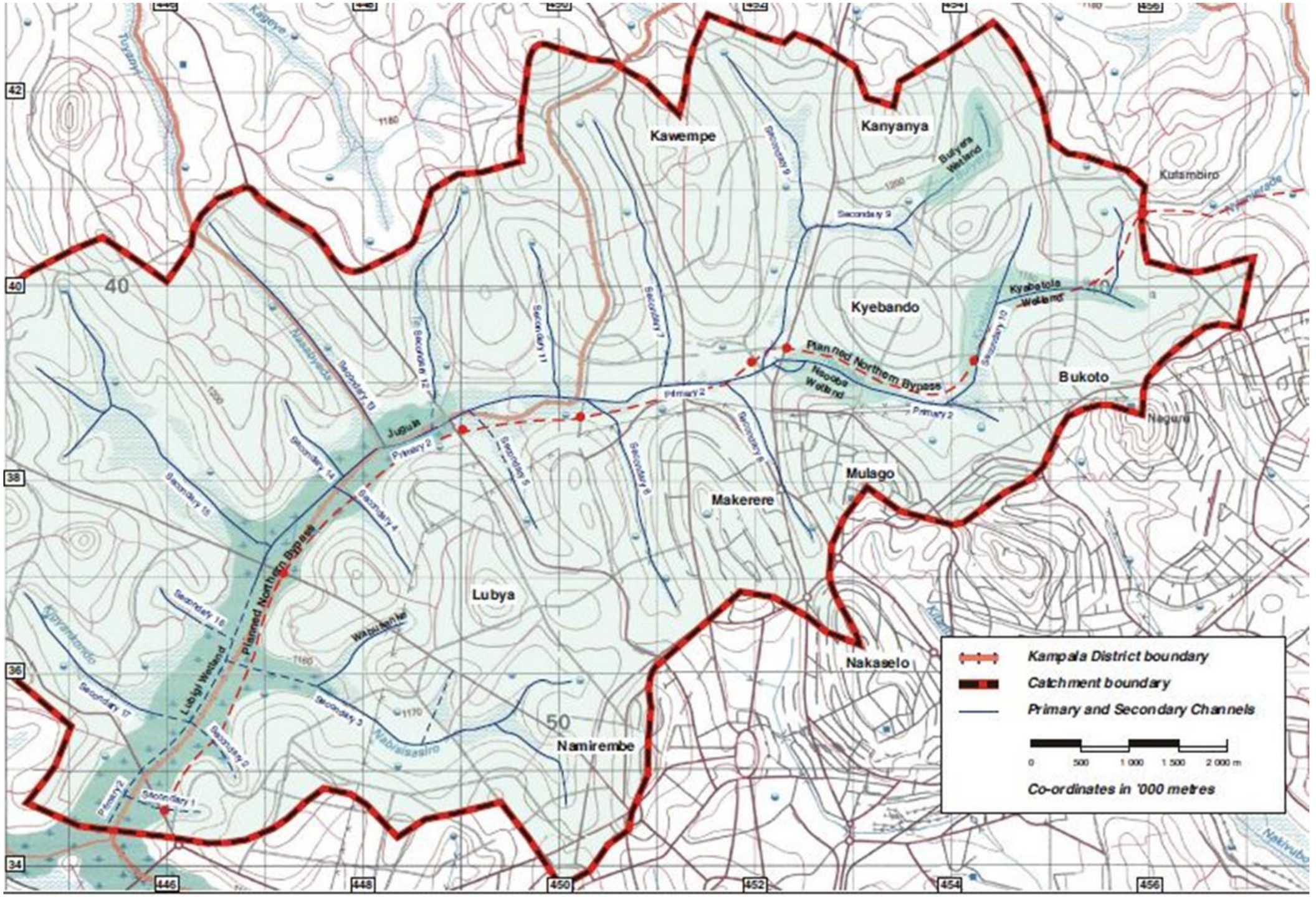
2.3 Current State of Storm Water Channels in the Project Area

This section describes the current state of the drainage channels within this Project, including but not limited to:

i) Location;
ii) Type of channel lining (earth or masonry);
iii) Structural and hydraulic state of the existing structures;
iv) Condition of channel crossings (culverts and bridges);
v) General sanitation conditions;
vi) Housing conditions;
vii) Available access for maintenance works; and
viii) Frequency and extent of flooding.

2.3.1 Primary System 2 – Lubigi

The catchment of Lubigi Drainage System 2 and the secondary channels are illustrated in Map 2-3.



Map 2-3: Primary Channel 2 and its secondary channels

2.3.1.1 Secondary Channel 1

This channel is located in Busega (Kigwanya and Kabale zones). The starting point for this channel is close to the Busega Northern Bypass roundabout. The entire length of the channel is natural/earth, with vegetation lining some parts. Residents reported intense and frequent flooding. The channel has no access roads or culvert crossings, and flows through a busy commercial centre upstream and a residential area downstream, before draining into the Lubigi Primary Channel.

Figure 2-1: Channel parallel to Northern Bypass

Figure 2-2: Section of busy market area that is reported to flood

Figure 2-3: Natural lining typical of entire Channel length

Figure 2-4: Channel crossings in the area

2.3.1.2 Secondary Channel 2

This channel is located in Kabale zone, Busega. The channel passes through a residential area of permanent built structures. The channel has masonry lining in areas between residential houses, but natural lining in all other sections. The residential area is not densely populated. Residents reported flooding along the channel during heavy rains.

Figure 2-5: Typical masonry lined channel section between residential houses

Figure 2-6: Typical unlined section along the channel

Figure 2-7: Vegetation along some channel sections

Figure 2-8: Health risk - child playing in stagnant water along channel section

Figure 2-9: Typical channel crossing in the residential area

Figure 2-10: Channel draining through Northern bypass culvert with high invert level causing stagnation

2.3.1.3 Secondary Channel 6

Secondary channel 6 starts off Sir Apollo Kaggwa road in Makerere-Kikoni area. The Channel divides Kawempe and Lubaga divisions, traversing through Makerere A, Makerere B, Tree shadow, and Kasubi 1, zones. The communities and types of structures through which the channel traverses range between slums with mud houses in Makerere Kikoni to commercial storeyed structures in Nakulabye. The channel is masonry lined, especially between residential houses and natural in other sections.

Figure 2-11: Illustrating variation of structures along channel, from mud houses to storeyed structures

The entire length between Makerere – Kasubi road and the end of Secondary Channel 6 (Kiwunya channel) is natural with evidence of regular maintenance works such as slashing the sides, dredging silt and removing garbage. This section also has a wide access road (2 - 3 m) along the bank, making it possible for garbage to be collected after cleaning. The channel has many tertiary channels draining into it at different levels, especially between residential houses off the Makerere – Kasubi road.

Figure 2-12: Channel Routine maintenance by KCCA subcontractors

Areas within the densely populated slum area are lined with garbage heaps in close proximity to the channel, resulting in garbage such as polythene bags and plastic bottles falling into and causing blockages along the channel. The general observation is that areas with road access beside the channel are significantly cleaner than those with no access.

Figure 2-13: Typical situation of garbage in channel lacking access for maintenance

Majority channel crossings are those improvised by residents for pedestrians and motorcycles (boda bodas). The crossings are made of material such as timber, and scrap metal (e.g. truck chassis) and do not appear safe for the community, especially children. Many of the crossings were intended to access shops and other business outlets along the channel. Because of the crossings' potential impact on the community sources of livelihood, consideration for their replacement needs to take care of the various functionalities.

Figure 2-14: Improvised channel crossings made of scrap metal (left) and timber (right)

Residents reported flooding in many sections of the channel, especially during heavy rains. In some sections the channel is narrow and pedestrian crossings set low, resulting in a constriction in the system. The constrictions in turn result in reduced conveyance capacity of the channel in those sections, hence increasing the potential for flooding upstream. Houses with built flood barriers or sandbags at the edge of the channel were further evidence of flooding in the area.

2.3.1.4 Secondary Channel 7

Secondary Channel 7 has its origins within Kawempe division and for the majority of length. The channel has a well formed channel section with masonry lining. Secondary Channel 7 traverses through high density residential areas whereas the lower reaches of the channel pass through areas of high density commercial (shops and markets).

In terms of its effectiveness as a drainage channel, Secondary Channel 7 is undersized and under capacity along the majority of its entire length. Flooding along the channel is widespread, frequent and severe with the duration of flooding varying from a matter of hours in some places to days in other areas along the channel according to residents.

Along the length of the drainage channel, local residents have constructed concrete flood barrier(s) across the doorways / entries to their homes to keep the floodwaters out as illustrated in Figure

2-15. These concrete barriers range in height from about 300 mm through to heights in excess of a metre and visually highlight the depth and extent of flooding along the channel.

Figure 2-15: Flood indicators – barriers to homes and buildings to keep floodwater out.

Whilst the location at which works will commence within Secondary Channel 7 has been adopted to reflect the start point within the 2003 Kampala Drainage Master Plan, there is a 275 m long section of channel upstream of this point which has some very steep and badly eroded sections and carries flow to secondary channel 7 as illustrated in Figure 2-16.

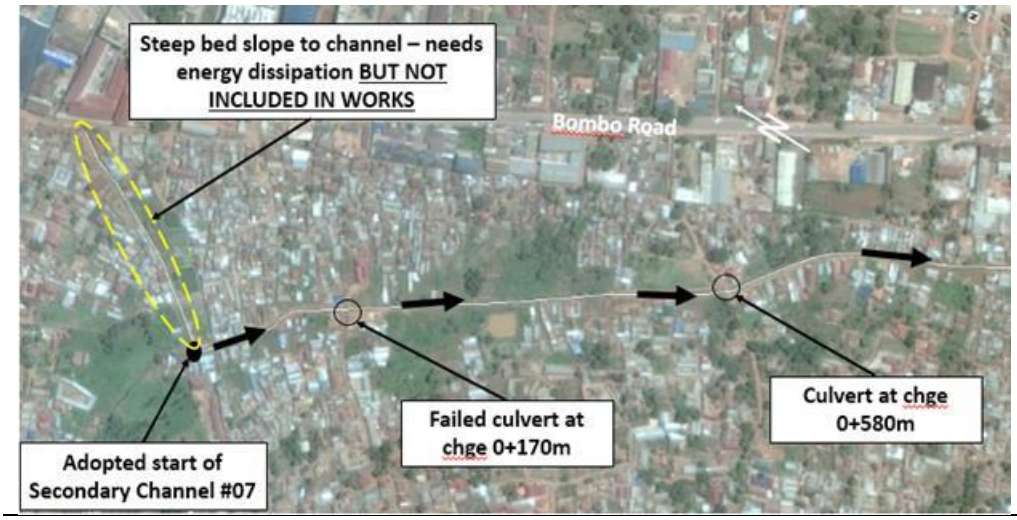


Figure 2-16: Location of start of Secondary Channel 7 - plus upper reach not in SOW

The 275 m channel section as illustrated in Figure 2-16, was not included into the scope of works (SOW) under this project. However, this section had a steep bed slope with large eroded gullies that required energy dissipation for proper functioning of the channel.

Secondary channel 7 is in a well formed section from the determined start of the channel downstream. There are some sections where the masonry lining on the channel banks has suffered erosion at the toe leading to collapse of the lining but in general, the channel section is in reasonably good condition over much of its length. However, whilst the channel generally appears to be structurally sound, it is incapable of conveying flood discharges and the tract of land adjacent to the drainage channel over much of its length suffers from extreme flooding on a regular basis.

Figure 2-17: The initial upstream reach of Secondary Channel 7 – typical of the channel

Culvert structures along the length of the drainage channel vary significantly in both structural and hydraulic condition and can be classified as ranging from:

- **Type A:** culverts which have failed both hydraulically and structurally and should either be physically removed from the channel or totally replaced but are held in place due to the amount of vehicular traffic in place;
- **Type B:** culverts which have failed structurally and should either be physically removed from the channel or totally replaced; and
- **Type C**: culverts which have been a major source of flooding and have been physically removed from the channel.

The culvert located at about chainage 0+180m falls into the Type B culvert classification. Advice from local residents indicates that the culvert failed some time ago and nobody can remember exactly when the culvert failed as the time since failure varies considerably amongst local residents. Whilst the local residents cannot agree on how long ago it was when the culvert failed, they are all in agreement on the flooding in and around the channel and agree that the culvert in its existing state contributes to the level of flooding.

At the time of inspection, there was very little evidence left of culvert headwalls but the pipe barrels were still in place with the usual debris blockage across the front central wall between the pipe barrels as illustrated in Figure 2-18.

Figure 2-18: Type B Culvert – located at about Chainage 0+180m

There remains a question as to whether the failed culvert located at about chainage 0+180m should be replaced with a new larger capacity culvert or replaced with a bridge to carry pedestrian and motor cycle traffic only. The decision on the need for and the nature of replacement of this culvert illustrated in Figure 2-18 and the extent of improvement to the approach road is a decision that will need to be determined in association with KCCA.

The channel condition remains structurally fair but hydraulically inadequate. In some sections, siltation has become extreme and vegetation has flourished in the very fertile sediment within the drainage channel. All these factors contribute to the inadequate hydraulic conveyance of the channel. However, it needs to be said that even with effective maintenance (i.e. sediment and debris removal) along the length of the channel, the capacity of the drainage channel would still be inadequate to convey the flood flows through to discharge into the Lubigi primary Channel.

There is an unnamed road crossing the drainage channel at about chainage 0+580m which consists of two (2) separate pipe barrels as illustrated in Figure 2-19 and Figure 2-20**.**

Figure 2-19: Approach channel to unnamed road culvert at about chainage 0+580m

Based on a visual assessment, the upstream headwall to this road culvert appears to be still in reasonably good structural condition with minor reinstatement requirements to the top right hand side of the head wall. This culvert suffers from the usual upstream entrapment of debris and solid waste causing the pipe opening to be partially blocked preventing through flow. The situation downstream of the culvert is different with the headwall significantly undermined and much of the headwall collapsed requiring a rebuild as illustrated in Figure 2-20.

Figure 2-20: Downstream headwall for unnamed road culvert at about chainage 0+580m

There is significant evidence of severe flooding in the area upstream of the road culvert located at chainage 0+580 m which is substantiated by the local residents all of which indicates that the culvert is hydraulically inadequate to handle the drainage discharges required. This culvert needs to be replaced with a larger capacity box culvert arrangement.

Continuing downstream, the secondary channel comprise of more road crossings plus an area identified as a "high risk" area for adjacent buildings, these items are identified on Figure 2-21 and discussed in the following sections.

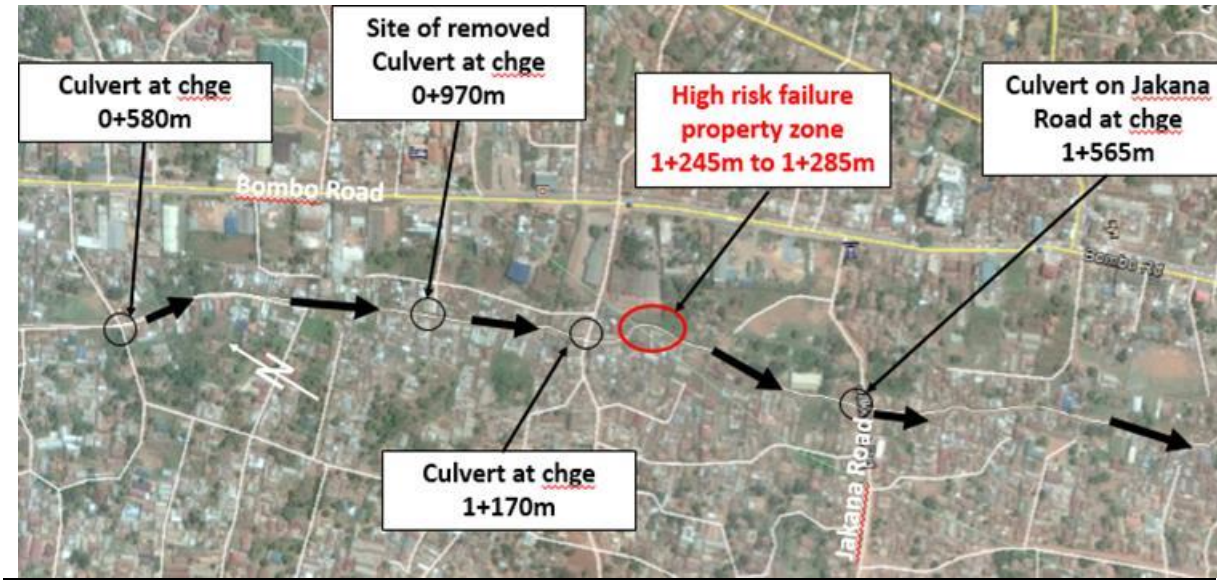


Figure 2-21: Drainage infrastructure on channel reach from 0+580m to 1+565m.

Further downstream, the hydraulic capacity of the channel is lower as the channel profile is both narrower and shallower than the sections upstream. Flooding occurs to a depth of about 0.5 metre in this area which is evidenced by the height of the flood barriers constructed by the local residents to the entries to their houses as illustrated in Figure 2-22.

Figure 2-22: Typical profile downstream of unnamed road culvert at about chainage 0+580m

Evidence of the problems associated with the installation of culverts of inadequate hydraulic capacity continue along the length of Secondary Channel 7 with perhaps the best evidence of culverts with hydraulic inadequacies being displayed at the site located at about chainage 0+970m. There is evidence of a break in the continuity of masonry lining along both banks of the drainage channel as well as remnants of an upstream headwall for a previously installed culvert at this site.

Local residents confirm that there had been a culvert installed at this site and the presence of the

culvert had caused so many flood problems in the immediate area that the residents called for the total removal of the culvert. Local flood barriers constructed by local residents adjacent to the channel are about one metre high. The current situation for this site is as illustrated in *Figure 2-31.*

Figure 2-23: Chainage at about 0+970m - culvert causing flooding removed by local residents

Along the course of this secondary channel and all other secondary channels, there is a significant number of incoming smaller sized drainage channels, all of which connect to the secondary channel at differing levels. Some of the incoming channels connect at a higher level than the secondary channels, while others connect almost at bed level in the secondary channel. In some instances, the incoming tertiary channels are almost as big in dimension as the secondary channels. Typical of the incoming tertiary channels to secondary channel 7 are illustrated in *Figure 2-24.*

Figure 2-24: Typical of the many tertiary channels connecting to the secondary channels

As Secondary Channel 7 continues its way downstream, it crosses an unnamed Road at about chainage 1+170m. This culvert consists of two (2) 1.0 m diameter pipes with a very high headwall. The invert levels for the incoming road drainage channels upstream of the headwall are deep and indicative of the extent of erosion within the area. Along with debris carried within the secondary channel and also by the contributing road drains, the culvert is prone to blockage resulting in extreme flooding upstream. The hydraulic capacity of the culvert is inadequate and is compounded

by an inefficient culvert structure arrangement as illustrated in *Figure 2-25.*

Figure 2-25: Inlet to culvert on Unnamed Road at chainage 1+170m

The downstream headwall and wing walls exhibit undermining of the base due to scouring during higher flows putting the headwall at risk of future collapse. The incoming road drainage channels have caused a collapse of masonry wall on the left bank of the channel as illustrated in Figure 2-26.

Figure 2-26: Outlet to culvert on Unnamed Road at chainage 1+170m

The alignment of Secondary Channel 7 downstream of the culvert at the unnamed Road follows a meandering path towards and past an extremely high boundary wall on the left hand side of the channel. This boundary wall contains and supports solid fill material and due to cracks observed on an initial visual assessment, the wall appears to have inadequate structural integrity and has the potential to collapse at some time in the future which classifies this boundary wall and the safety of the drainage channel as a "*high risk*" area. The high boundary wall and the channel approaching the wall are illustrated in Figure 2-27.

Figure 2-27: Upstream approach of Secondary Channel 7 to the high boundary wall

The high boundary wall has buttress columns supporting the retaining walls but sections of the walls show signs of bulging to varying degrees. The height of fill behind the retaining / boundary wall appears to be to the top of the buttress columns. This fill appears to be excessive for the retaining wall. The alignment of Secondary Channel 7 is away from the base of the buttress columns to the retaining wall and in reality needs to be shifted further away from the wall. The increased distance between the wall and the channel is meant to ensure that if the wall does collapse at some time in the future, the drainage channel cannot be attributed to the failure of the wall. The extremely high retaining wall and the secondary channel are illustrated in Figure 2-28.

Figure 2-28: Secondary Channel 7 passing adjacent to the high boundary wall

The secondary channel downstream of this area continues with a minor meandering alignment down to the Jakana Road culvert which is in a very poor condition. The culvert is inadequate in hydraulic capacity, suffers from entrapment of incoming debris on the upstream face of the culvert which results in blockages to pipe barrels and resultant overtopping of the road culvert. The only remaining resemblance to a headwall on the culvert is a minor piece of masonry to the upper left wing wall as illustrated in Figure 2-29.

Figure 2-29: Upstream Headwall to Jakana Road Culvert

The culvert regularly overtops due to its hydraulic inadequacies, worsened by upstream blockages from channel debris, inadequate pipe capacity and the lack of any headwall to restrain the raised water levels upstream of the culvert. The culvert needs to be replaced with a culvert with adequate hydraulic capacity and a lower potential to upstream blockage. The signs of overtopping are more visible when viewed from downstream as illustrated in Figure 2-30.

Figure 2-30: Downstream outfall from Jakana Road Culvert

As the channel continues on its downstream course, the many signs and indicators of flooding along and adjacent to the drainage channel are visible. Figure 2-31 illustrates the typical flood prevention barrier constructed by local residents to the doors / entries to their properties to exclude floodwaters from entering their buildings.

Apart from the physical reality of preventing entry of flood waters into the buildings, the flood prevention barriers indicate the existence of flooding and the depth of flooding within the area.

Figure 2-31: Typical flood prevention barrier constructed by local residents for the doors

Prior to ultimate discharge into the Lubigi Primary Channel, Secondary Channel 7 crosses Nabweru Road which is the central location of an extremely busy market area. The culvert exhibits signs of severe deterioration to the upstream headwall with undermining of the base of the headwall and partial demolition to the outer edges of the headwall. The state of the headwall is possibly due to a combination of incoming road drainage flow and traffic mishaps.

The hydraulic capacity of this particular culvert will need to be assessed to determine the proposed course of action for this culvert. The general arrangement of the headwall to the inlet of the Nabweru Road culvert is illustrated in Figure 2-32. A community leader engaged by SMEC field team indicated the preference of replacing the culverts with a “bridge” to avoid the persistent blockages.

Figure 2-32: Upstream Headwall to Nabweru Road

Immediately downstream of and effectively part of the culvert outfall arrangement is a series of pipes and conduits crossing the channel, all carrying a multitude of utility services. In replacing / restoring the culvert outfall, these utilities will need to be identified and incorporated into the final culvert arrangement. The general arrangement of the outlet of the Nabweru Road culvert is illustrated in Figure 2-33.

Figure 2-33: Downstream Headwall / Outfall to the Nabweru Road culvert

Once past the Nabweru Road culvert, Secondary Channel 7 follows an uninterrupted course to discharge into Lubigi Primary Channel 2 as illustrated in Figure *2-34.*

Figure 2-34: Channel 7 between Nabweru Road culvert and Lubigi Primary Channel 2

2.3.1.5 Secondary Channel 8

This channel is relatively long and very complex, especially at its proposed start within Kimwanyi zone in Katanga, Makerere area. It traverses through the Mulago area (Mugwenda zone), and Makerere 1 Parish (Mini Triangle zone) and Makerere 3 parish (Dbobi zone). The start of the channel is in a very densely populated slum area, with very poor sanitary conditions. The channel's base flow is made of raw sewage that is stagnant in many parts. The channel is unlined along its entire length, except for sandbags in the slum area up to the Mulago roundabout; thereafter the channel is stone-pitched up to Lubigi channel.

A sewer line (Figure *2-35*) criss-crosses the channel along most of the channel length and will be a determining factor in how deep the channel can be designed so as not to interfere with the operation of the existing sewer line.

Figure 2-35: One of the sewer line manholes along Secondary 8

Upstream, the channel traverses a mixed residential and commercial area in the Katanga slum (*Figure 2-36*). Downstream, the channel traverses through the busy commercial area of Mulago (Figure *2-37*). Businesses in the area include car wash points (source water from streams flowing into the drainage channel), carpentry workshops, and stationery shops.

Figure 2-36: Densely populated Katanga area along the channel

Figure 2-37: Busy commercial area along the channel in Mulago

Residents along the channel provided differing feedback about the extent of flooding in the area, ranging from 'infrequent and uncommon except for very heavy rains', to 'heavy flooding every time it rains'. A number of dilapidated and abandoned structures were observed along one of the channel sections, with frequent flooding as the most likely cause.

The channel length downstream of the Katanga slum and upstream of Mulago roundabout has a wide access road (2-3 m) and circular culverts that were mostly working (not blocked). The section downstream of the Mulago roundabout has no culverts and only bridges are used for pedestrian and cyclists crossing. The bridges are made of concrete, timber and scrap metal.

Figure 2-38: Typical bridge channel crossings along the channel section through Mulago

Figure 2-39: Clogged culverts at the Northern bypass before draining into Primary 2

The end of this secondary channel is parallel to the Lubigi Primary channel 2 upstream of the Northern bypass Busega roundabout, and drains into the Lubigi primary channel downstream of this roundabout. The Northern bypass culverts are clogged at this point, resulting in water stagnation in the channel. The width of the channel varies greatly along its entire length but generally is progressively smaller downstream towards Lubigi Primary Channel 2.

2.3.1.6 Secondary Channel 9

Section 9 starts in Kikaya B zone, Kyebando. The channel traverses through Kyebando (Kikaya B, Kitala, Kanyanya Quarter, Kakungulu, Lutonda, and Katale zones) and eventually drains into Lubigi Primary Channel 2 at the Northern bypass roundabout in Kalerwe. The channel is unlined, except for a short section of the Kisaasi-Bahai road drainage.

In Kikaya B zone, the sanitation condition along the channel length is poor, with pit latrines along the channel section in that area. The section in Kitala zone was characterized by swampy vegetation and small capacity culverts that were blocked in most cases. Residents in the area complained about frequent flooding, and this was corroborated by the flood barriers in front of houses in the area.

Figure 2-40: Typical housing situation with latrines along the channel

In Kanyanya Quarter zone, along the newly constructed Bahai road, severely blocked culverts have resulted in water stagnation at that point. Fish survives well in the water ponded at the culverts at that point an indication of the ecological quality of the channel section.

Figure 2-41: Boys fishing along the channel

Along many sections of this channel, the circular culverts were severely blocked, preventing the flow of water, and thus contributing to the frequency and severity of flooding in the area.

Figure 2-42: Blocked culverts by grit (left) and garbage (right) along the channel

In Kakungulu and Lutonda zones, a complex diversion of the channel exists. Secondary Channel 9 was diverted by a school to pass between houses. However, residents reported that the diversion created flooding problems since flood waters choose to flow along the original path. A number of diversions downstream of the school are also found and it is unclear which path the secondary channel follows in some of these sections.

Figure 2-43: School area where the secondary channel was diverted creating a complex situation

2.3.1.7 Secondary Channel 10

This channel stretches from Kisalosalo zone in Kyebando (Northern bypass roundabout to Kyebando) and drains into the Lubigi Primary Channel at the Bukoto - Kisaasi Northern Bypass flyover. The channel is mostly natural (earth lining) with masonry lining in sections along the Northern bypass road drainage.

Many sections along the channel have blocked culverts due to siltation. One instance of constriction along the channel was observed to be caused by an improvised culvert crossing to make an illegal connection to the Northern bypass (Figure *2-45*). The improvised culvert that leads to secondary 10 constricts flow and is a very likely cause of flooding reported in the area.

Figure 2-44: Earth lined section typical of the channel length

Figure 2-45: Improvised culvert at one section along the channel

The Northern bypass expansion works are within the project area for this Secondary channel 10 and will therefore fall into the construction jurisdiction of the Northern bypass works (Figure *2-46*). Some culverts along the Northern bypass appear to be inadequate for flow conveyance, an example of which is along Secondary 10 (Figure *2-47*). The culverts are covered with at least 4 m of fill material below the flyover, making any works on the blocked/inadequate culverts difficult.

Figure 2-46: On-going Northern bypass expansion works in Project area

Figure 2-47: Blocked culvert below Northern bypass Bukoto-Kisaasi flyover

An area of concern along the channel section is the Tirupati Development Business Park that lies within a large floodplain. The development park has reclaimed a large section of the floodplain, with signs of more reclamation for future developments to soon take place. The challenge with such reclamation is that more volume of storm water has to be channelized, as opposed to natural retention in such a floodplain, and hence increases the sizing requirements for the channel downstream, as well as involuntary resettlement of affected persons.

Figure 2-48: Tirupati Industrial Park Development in floodplain along Secondary 10

Figure 2-49: Swamp reclamation as part of Tirupati Business Park development

2.3.2 Primary System 4 and 4A – Kansanga and Gaba

In general the drainage channels within the upper Kansanga catchment area present a confused picture of the situation to the extent that it has been and continues to be difficult to determine which channel(s) could be termed as Primary Channel(s) and which could be termed as Secondary Channel(s).

As such, the terminology adopted for the definition of primary and secondary channels and in particular the naming / numbering within this (and future) presentation(s) is based on the channel terminology as applied during the development of the 2003 Kampala Drainage Master Plan (KDMP).

The extent of the flood lines at the confluences of the Secondary Channels 1, 4 and 5 and the primary channel (Kansanga) are extremely wide. At the downstream end of Kansanga Channel flowing to Lake Victoria, as well as the confluence of Secondary Channel 4 with the primary channel, swampy areas should be preserved as wetlands to keep the floodplain in these areas as wide as it is. The floodplain at the downstream end of Kansanga and at the confluence with Secondary Channel 4 should be preserved as wetlands. It should, however, be noted that caution is required in making this interpretation (extent of preservation of wetland as flood plain), due to inaccuracies in the survey of the wetlands.

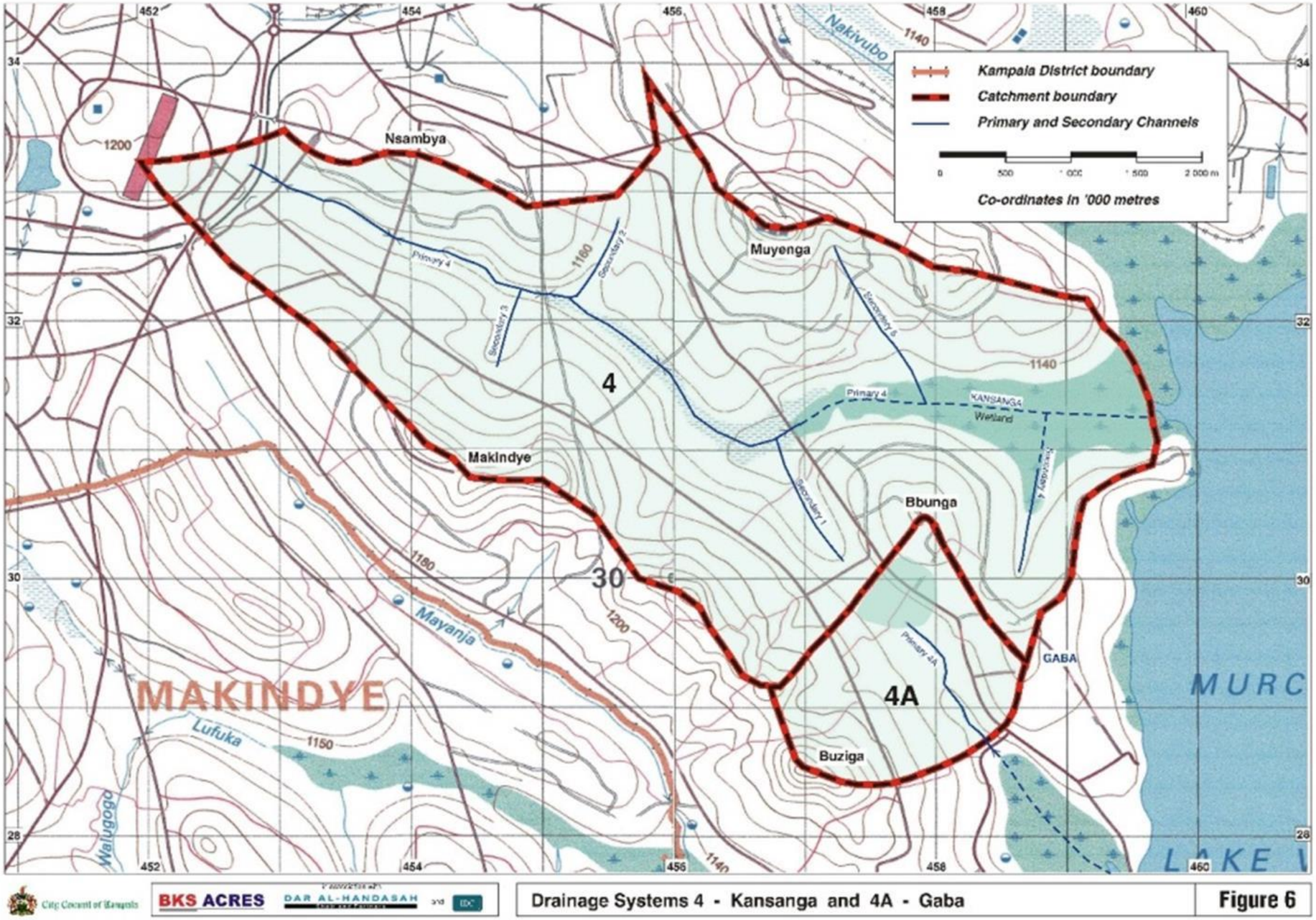
The existing drainage channels within the Kansanga drainage system have been classified as detailed in Table 2-5.

Table 2-5: Number and classification of Drainage Channels within Kansanga Drainage System

Channel Name	Location	Channel Length (km)
Primary Channel 4		7.2
Secondary Channel 5		1.20
Secondary Channel 4		0.90
Secondary Channel 3		0.65
Secondary Channel 2		1.32
Secondary Channel 1		1.55

Source: 2003 Kampala Drainage Master Plan (KDMP)

The layout of channels within the Kansanga Drainage System is illustrated in Map 2-4.



Map 2-4: Primary Channel 4 and 4A - Kansanga and Gaba

2.3.2.1 Primary Channel – Hanlon Road Crossing

About 400 metres from the junction of Kayemba Road and Hanlon Road, the Kansanga Primary Channel 4 crosses Hanlon Road. The Kansanga Primary channel approach section has developments almost up to the edge of the banks of the main channel but still has managed to retain a minimal space for access (walking) along each bank as illustrated in Figure 2-50**.**

Figure 2-50: Kansanga Primary channel approach to Hanlon Road crossing

The actual cross drainage structure for the Kansanga Primary Channel under Hanlon Road is a five (5) barrel pipe culvert. The upstream headwall of this particular crossing which also acts as a capture point for floating debris in the channel is illustrated in Figure *2-51*.

Figure 2-51: Kansanga Primary channel – Upstream culvert headwall Hanlon Road Crossing

The capacity of the cross drainage structure appears to have been expanded at some time with the addition of two (2) larger diameter additional pipe culverts to the left hand side of the structure. Immediately downstream of the culvert outfall, there is a cascade type of arrangement which has the effect of lowering the channel bed level as illustrated in Figure *2-52*.

Figure 2-52: Kansanga Primary channel – Hanlon Road culvert outfall

At the time of the site visit, there was too much low and debris within the channel to identify the real need for the cascade arrangement but it may be that there are water supply pipelines or sewer conduits across the base of the channel immediately downstream of the culvert.

Downstream of Hanlon Road, the Kansanga Primary Channel continues to flow downstream in an easterly direction with the condition of the channel section being as illustrated in Figure *2-53*.

Figure 2-53: Kansanga Primary channel - downstream of Hanlon Road culvert outfall

2.3.2.2 Primary Channel – Gogonya Road Crossing

About 400 metres from the junction of Kayemba Road and Gogonya Road, the Kansanga Primary Channel 4 crosses Gogonya Road. Whilst there has been development on either side of the Kansanga Primary channel, there is adequate area on both banks for access for motor cycle and pedestrian with potentially some limited access for small vehicles as illustrated in Figure 2-54.

Figure 2-54: Kansanga Primary channel approach to Gogonya Road crossing

The actual cross drainage structure for the Kansanga Primary Channel under Gogonya Road is a five (5) barrel pipe culvert. The upstream headwall of this particular crossing which acts as a capture point for floating debris (plastic bottles and shoes) in the channel as illustrated in Figure *2-55*.

Figure 2-55: Kansanga Primary channel – Upstream culvert headwall Gogonya Road crossing

Just upstream of the culvert inlet, there is a suspended small diameter water pipe across the channel which interferes with the flow and captures a considerable amount of floating debris which as the amount captured accumulates the impact on the channel conveyance increase. The current situation is illustrated in Figure 2-56.

Figure 2-56: Kansanga Primary channel – Upstream culvert headwall Gogonya Road crossing

As for the Hanlon Road culvert, the hydraulic capacity of this culvert appears to have been expanded at some time with the addition of a single large diameter pipe barrel to the right hand side of the

structure. Immediately downstream of the culvert outfall, there is a small diameter water pipe across the base of the channel which acts as a debris trap. The current situation for the downstream headwall of this culvert is as illustrated in *Figure 2-57*.

Figure 2-57: Kansanga Primary channel – Downstream culvert headwall Gogonya Road crossing

The base of the downstream culvert headwall and the downstream lengths of the concrete pipes have been undermined which has resulted in the collapse of the pipe sections and headwall. The structure will need to be totally rebuilt. The collapsed state of the downstream headwall is illustrated in Figure 2-58.

Figure 2-58: Kansanga Primary channel – Collapsed state of downstream culvert headwall

Downstream of Gogonya Road, the Kansanga Primary Channel continues to flow downstream in an easterly direction with the condition of the channel section being as illustrated in Figure 2-59.

Figure 2-59: Kansanga Primary channel - downstream of Hanlon Road culvert outfall

2.3.2.3 Kansanga Primary Channel - Soweto Road Crossing

About 1,100 metres along Gaba Road to the south of the junction of Soweto Road and Gaba Road, the Kansanga Primary Channel 4 crosses Gaba Road. On first impression, this area seems to have

retained some resemblance of the original wetland formation although there are signs of agricultural development within the area.

There is a major water supply pipeline crossing the channel upstream of the culvert. The current environment within the area surrounding the channel approach to Gaba Road crossing is as illustrated in Figure 2-60.

Figure 2-60: Kansanga Primary channel approach to Gaba Road crossing

The actual cross drainage structure for the Kansanga Primary Channel under Gaba Road is a three (3) barrel pipe culvert. Initial indications are that at best case scenario, only 1 ½ of the pipes are operational and at worst case scenario, only the pipe on the right side of the culvert is operational. The left hand side of the culvert on approach is totally silted and major de-silting works will be required to get this culvert operational again. The current situation for the inlet to Gaba Road culvert is illustrated in Figure 2-61.

Figure 2-61: Kansanga Primary channel – inlet to Gaba Road crossing

In addition to the large diameter water pipe across the channel upstream there is also a large diameter water pipe across the channel immediately downstream of the road crossing. The channel section downstream of the crossing appears to be in reasonable condition on first impressions. The current situation is illustrated in Figure 2-62.

Figure 2-62: Kansanga Primary channel - downstream of Gaba Road crossing

2.3.2.4 Gaba Primary Channel – Wavamunno Road Crossing

About 100metres along Wavamunno Road to the south of the junction of Gaba Road and Wavamunno Road, the Gaba Primary Channel crosses Wavamunno Road. There has been a considerable amount of development in the upstream reaches of the catchment with many occupants extending their usable properties by filling in the floodplain areas and retaining the placed fill on their properties by constructing retaining walls. As a result, the area available to drainage flows has become constricted with many blockages in the drainage path as illustrated in Figure 2-63**.**

Figure 2-63: Gaba Primary channel - approach to Wavamunno Road crossing

The approach channel to the Wavamuno Road crossing is as illustrated in Figure 2-63 and *Figure 2-64*.

Figure 2-64: Gaba Primary channel - approach to Wavamunno Road crossing

2.3.3 Primary System 6 – Kinawataka

Within the upper catchment, the layout of the Primary and Secondary Channels presents a confused picture with the channel alignments being diverted again and again over time, with a diversion occurring with almost every new construction within the industrial development area.

As such, the terminology adopted for the definition of primary and secondary channels and in particular the naming / numbering are based on the channel terminology as applied during the development of the 2003 Kampala Drainage Master Plan (KDMP).

The existing drainage channels within the Kinawataka drainage system have been classified as detailed in Table 2-6.

Table 2-6: Number and classification of Drainage Channels within Kinawataka Drainage System

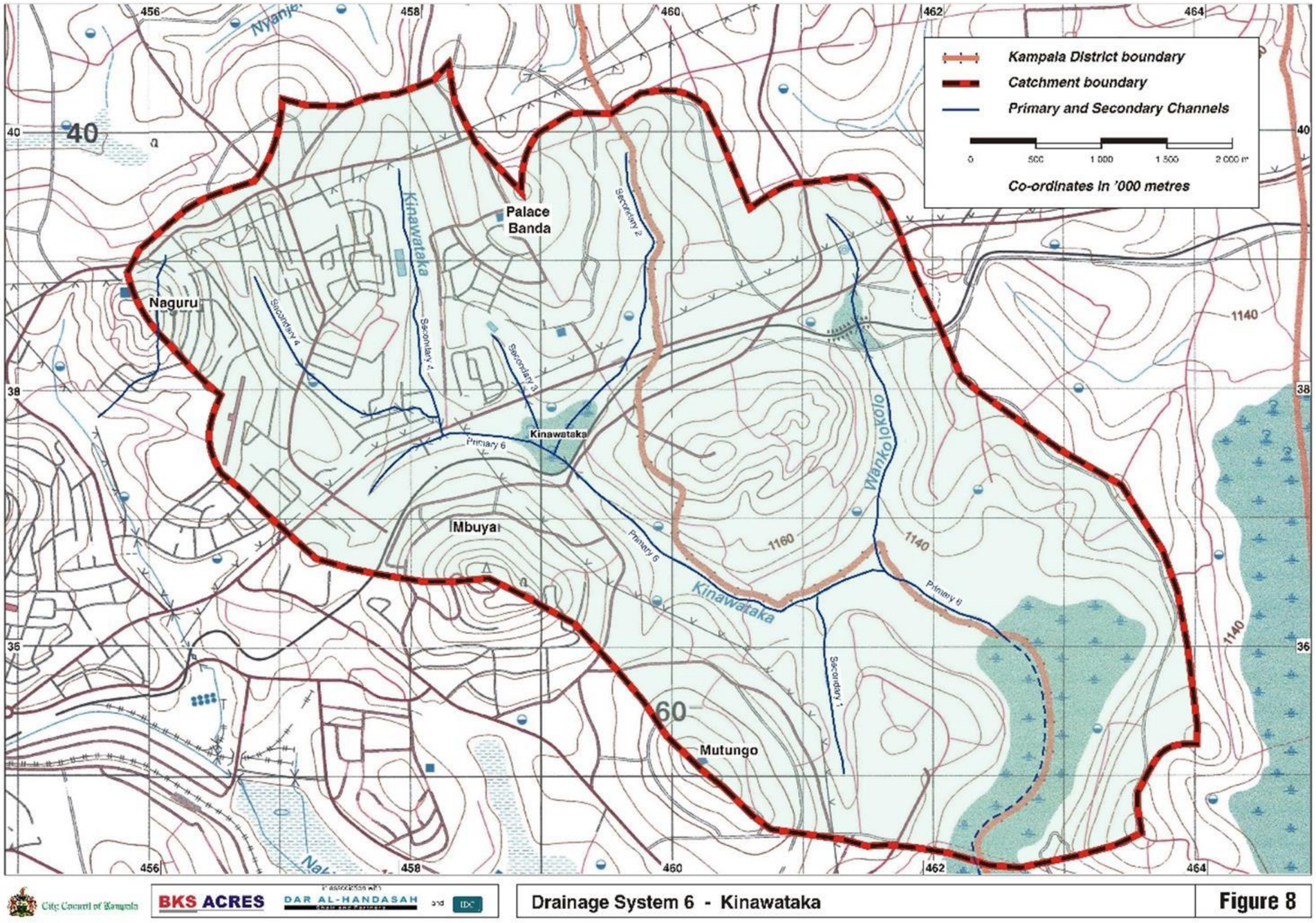
Channel Name	Location	Channel Length (km)
Primary Channel #6	Main channel in main drainage path discharging to the wetland area adjacent to Lake Victoria.	8.6 km
Secondary Channel 4A	One of 2 secondary channels located in upper catchment area – residential in the upper area with industrial complexes in the lower portion. This located channel (lies west of Secondary Channel 4) merges with Secondary Channel #04 prior to discharging into Primary Channel 6.	1.7 km
Secondary Channel 4	The other secondary channel located in upper catchment area – residential / parkland in the upper area with industrial complexes in the lower portion. This channel merges with the other named channel 4 prior to discharging into Primary Channel 6.	3.0 km
Secondary Channel 3	Open space / agriculture area in the upper catchment area with industrial complexes in the lower portion.	1.3 km
Secondary Channel 2	Open space / agriculture area in the upper catchment area with residential development in the lower portion. This channel discharges into what was previously an extensive wetland area.	1.5 km
Secondary Channel 1	Open space / agriculture area in the upper catchment area with residential development in the lower portion. This channel discharges into what was previously an extensive wetland area.	1.8 km

Source: 2003 Kampala Drainage Master Plan (KDMP)

The layout of channels within the Kinawataka Drainage System is illustrated in Map 2-5. The major wetland area immediately upstream of the junction of Primary Channel 6 and Kireka Road is being diminished in size and capacity due to encroachment for further land development. What appears to

be unregulated dumping of earth material along Kireka Road into the edge of the existing wetland is causing diminishing of wetland area.

The Ugandan Government has a program to upgrade the speed of the rail network within Kampala. To do so will either necessitate the use of sophisticated rolling stock to cater for higher speeds on the existing rail track or to realign the existing track to give larger radius of curvature for higher speeds. At the junction of Primary Channel 6 and Kireka Road, the current rail alignment follows a very tight radius of curvature which will restrict speeds of the railway system and will require a major change. The proposed rail alignment needs to be confirmed but on the assumption that the curvature has to be enlarged, any track realignment in this immediate area will push the rail embankment out into the middle of the existing wetland, causing further reduction in retention effects within the wetland.



Map 2-5: Primary Channel 6 - Kinawataka and the secondary channels

2.3.3.1 Primary Channel – Kireka Road Crossing

Kinawataka Road joins with Kireka Road to the immediate west of the location in the floodplain where the Kinawataka primary channel crosses Kireka Road. Whilst the upstream floodplain would have provided a reasonable amount of flood retention, the catchment has come under severe attack with small and large developments encroached well into the floodplain. Even adjacent to Kireka Road, there is evidence of earthworks encroaching into the floodplain as illustrated in Figure 2-65.

Figure 2-65: Kinawataka Primary channel catchment upstream of Kireka Road crossing

Upstream and adjacent to and parallel to the Kinawataka Road and Kireka Road alignments, there is an existing railway line which is still operational although apparently with minimal number of rail services per week along this line. The designated drainage channel approach to the rail way crossing is illustrated in Figure 2-66.

Figure 2-66: Kinawataka Primary channel - upstream approach to rail line crossing

Figure 2-67 illustrates the rail embankment and the downstream headwall of the railway culvert.

Figure 2-67: Kinawataka Primary channel - downstream headwall to rail line culvert

Once the drainage flow has passed through under the railway embankment, the flow turns at right angles and through a short but wider channel section which is aligned parallel to Kireka Road. This section of channel may well provide some additional minor retention to the incoming flow but any real restrictions to drainage flows would be through the capacity of the rail and road culverts. The general alignment of the drainage channel is via the culvert under the rail embankment to the left of the image and then via two (2) separate culverts with inlets under the floating debris in the immediate foreground of the image presented as Figure 2-68.

Figure 2-68: Kinawataka Primary channel – section between rail embankment and Kireka Road culverts

There are two (2) separate culvert barrels passing under Kireka Road which are aligned so that whilst the pipe inlets are apart thereby forming separate culvert upstream inlets, the alignment of the pipes under Kireka Road brings the pipes close together at the outlet so that discharge is through a combined outlet arrangement as Illustrated in Figure 2-69.

Figure 2-69: Kinawataka Primary channel - Kireka Road culvert outfall

Downstream of Kireka Road culvert, the Kinawataka Primary Channel continues to flow downstream in an easterly direction with the condition of the channel section being as illustrated in Figure 2-70.

Figure 2-70: Kinawataka Primary channel - downstream of Kireka Road culvert

2.3.3.2 Secondary Channel 2

The contributing catchment for Kinawataka secondary channel 2 lies to the north of Jinja Road and to the east of Banda Palace with the main channel crossing Jinja Road at about 1,200 metres west of the junction of Jinja Road and Kireka Road. Secondary channel 2 crosses Jinja Road via a culvert consisting of two (2) concrete pipes which outfall into the main road drainage which lies adjacent to the westbound traffic lane on Jinja Road as illustrated in Figure 2-71**.**

Figure 2-71: Kinawataka secondary channel 2 – outfall to Jinja road culvert

The channel then follows this alignment for about 50 metres up to a point where the channel diverts away from the road alignment in a south westerly direction ultimately linking up with the primary channel within the wetlands upstream of Kireka Road. The point at which the channel diverts away from the road alignment is illustrated in Figure 2-72.

Figure 2-72: Kinawataka secondary channel 2 – diversion away from Jinja Road

2.3.3.3 Kinawataka Secondary Channel 2 – market lane crossing

About 180 metres along Jinja Road west from where Secondary Channel 2 diverges away from Jinja Road, there is a small lane which heads south through an intensively developed market area. Turning south off Jinja Road and following this lane for about 110 meters leads to a point where Secondary Channel 2 crosses this lane. The area of land adjacent to the approach channel is densely populated on both sides but there is vehicle and pedestrian access along the right bank of the channel as illustrated in Figure 2-73.

Figure 2-73: Kinawataka secondary channel 2 – approach channel to lane crossing

The actual cross drainage structure for this particular crossing is a two (2) barrel pipe culvert. The upstream headwall appears to capture a considerable amount of debris and this could have a negative impact on flow characteristics through the culvert. The upstream headwall of the culvert is illustrated in Figure 2-74.

Figure 2-74: Kinawataka secondary channel 2 –upstream headwall for lane crossing

Downstream of this unnamed lane, the Kinawataka secondary channel 2 continues to flow downstream in a south-westerly direction with the condition of the channel section generally as illustrated in Figure 2-75.

Figure 2-75: Kinawataka secondary channel 2 – downstream of lane crossing

2.3.3.4 Secondary Channel 3

About 700 metres to the east of the junction of Jinja Road and Kyambogo Road is the MOIL Fuel Station which is accessible to westbound traffic on Jinja road. Along the western boundary of this fuel station lies the alignment of Secondary Channel 3 after the Jinja Road crossing. The approach section for the channel north of Jinja Road has been significantly reduced by construction of an access road to the adjacent warehouses / buildings illustrated on Figure 2-76.

Figure 2-76: Kinawataka secondary channel 3 – approach channel to Jinja Road crossing

The actual cross drainage structure for the Kinawataka Secondary Channel 3 under Jinja Road is a two (2) barrel corrugated iron pipe culvert. The upstream inlet arrangement has deteriorated to a point where by it is almost unrecognisable as a culvert inlet arrangement and will need to be rebuilt. A similar situation exists for the culvert outfall. The culvert inlet and outfall arrangements are illustrated in Figure 2-77 and Figure 2-78, respectively.

Figure 2-77: Kinawataka secondary channel 3 – inlet to Jinja Road culvert

Figure 2-78: Kinawataka secondary channel 3 – outlet to Jinja Road culvert

Downstream of Jinja Road crossing for Secondary Channel 3, the secondary channel continues to flow in a southerly direction with the condition of the channel section being as illustrated in Figure 4.16. The channel width is generally restricted by the boundary walls of the developments.

Figure 4.16 Kinawataka secondary channel 3 - downstream of Jinja Road culvert outfall

2.3.3.5 Secondary Channel 4

Kinawataka Secondary Channel 3 crosses Jinja Road at the junction of Jinja Road and Kyambogo Road. The cross drainage structure is interwoven with the intersection. Secondary channel 3 which flows in from the north lies in the road reserve adjacent to the Royal Foam Furniture building. The retaining walls which form the boundary of the commercial compound form part of the channel profile as illustrated in Figure 4.17.

Figure 2-79: Kinawataka secondary channel 4 – approach channel to Jinja Road crossing

The actual cross drainage structure for the Kinawataka Secondary Channel 4 under Jinja Road is a three (3) barrel box culvert arrangement. At the time of inspection, the culvert appeared to have inlet control with a marked differential in levels between the upstream and downstream water levels. The culvert inlet and outfall arrangements are illustrated in Figure 2-80 and Figure 2-81, respectively.

Figure 2-80: Kinawataka secondary channel 4 – inlet to Jinja Road culvert

Figure 2-81: Kinawataka secondary channel 4 – outlet to Jinja Road culvert

The channel arrangement downstream of the Jinja Road crossing for Secondary Channel 4 is a very complex arrangement with a number of channels all coming together in the immediate vicinity. Immediately downstream of the road crossing, a channel merges with Secondary channel 4 from the west and then the combined flow continues to flow downstream in a southerly direction until encountering a bridge on the access road to the OxyGas property.

A small collection drainage channel empties into secondary channel 4 immediately upstream of the access bridge. Immediately downstream of the OxyGas access road bridge, another major drainage channel discharges into secondary channel 4. The channels upstream of the OxyGas access road and bridge are illustrated in Figure 2-82**.**

Figure 2-82: Kinawataka secondary channel 4 – channels downstream of Jinja Road culvert

2.4 Project Design

The peak design flows, on which the various design aspects for the Project infracture as detailed in Section 2.1 are based, are provided in Figure 2-83 to **Figure 2-85**. Typical channel designs considered for this Project are provided in volume 2; Appendices Report.

2.5 Scope of Works

2.5.1 General

The following tabulated infomation summarises the works proposed to be undertaken along each of the Primary and Secondary Drainage channels to improve the capacity of the priority drainage. The scope was determined through a combination process of field observations, topographical surveys, geotechnical investigations, hydrological analysis, structural and hydraulic assessments. These were conducted to identify the effectiveness of the existing drainage infrastructure and to determine the dimension of drainage infrastructure (both channel and structures) required to convey the Q_{10} design discharge. Information on the physical works that will be carried out during the construction phase for each channel are shown in Table 2-7 to Table 2-10.

Table 2-7: Proposed works in Lubigi Catchment

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
LUBIGI PRIMARY CHANNEL			
Old Kira Road	Road	✓	Replace culvert
	Channel	✓	Channel modification
Gayaza Road	Road	×	Culvert remodelled by Northern Bypass
	Channel	×	No work to existing channel
Bwaise	Road	×	No work to culvert - retain existing culvert
	Channel	✓	Channel modification
Kawaala Road	Road	×	No work to culvert - retain existing culvert
	Wetland	✓	Extention of the channel over entire new section of a secondary wetland up to Hoima Road
Hoima Road	Road		The structure will need to be upgraded but could be undertaken as part of Northern Bypass or as part of the Busunju Expressway. Major planning required.
	Wetland		Retain wetland
Sentema Road	Road		Major planning required on future works. Will need a new road over the entire floodplain plus a major drainage structure.
Lubigi Secondary Channel #01			
Start	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #02			
Start	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #03			
Start	Road	✓	Upgrade culvert

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
	Channel	✓	Channel modification and culverts
Selema Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modifications
Makamba Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modifications
Mugema Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modifications
Start of Wetland area	Ground	✓	End - transition of channel to wetland
	Wetland	✗	Retain wetland
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #03A			
Start #03A	Road	✓	Upgrade culvert
	Channel	✓	Channel modification and culverts
Kineaw Lane	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Start Wetland area	Ground	✓	End - transition of channel to wetland
	Wetland	✓	Retain wetland
Merge with Sec #03	Channel	✓	Merge with Secondary Channel #03
Lubigi Secondary Channel #03B			
Start #03B	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Selema Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification and culverts
Start Wetland area	Ground	✓	End - transition of channel to wetland
	Wetland	✗	Retain wetland
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #04			
Start of Sec#04	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Unnamed Road	Road	✓	Culvert upgrade
	Channel	✓	Channel modification
Start of Wetland area	Ground	✓	End - transition of channel to wetland
	Wetland	✗	Retain wetland
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #05			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Prince Luswata Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Muteesa Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #06			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kimera Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kawaala Bwaise Rd	Road	✓	Upgrade culvert
	Wetland	✗	Retain wetland

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #07			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Un-named Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Jakana Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Nabweru Road –	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Lubigi Channel	Lubigi Channel		Upgrade connection
Lubigi Secondary Channel #08			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kalanga Pedes Path	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kubiri Roundabout	Roundabout	✗	No work to culvert
	Channel	✓	Channel modification
Church Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #09			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Bahai Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Gayaza Kempala Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kawempe Tula Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Nabweru Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #09A			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kommboga Bahai Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Sec Channel #09	Channel	✓	Channel modification
Lubigi Secondary Channel #09B			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kommboga Bahai Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Sec Channel #09	Channel	✓	Channel modification
Lubigi Secondary Channel #10			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kisaasi O/pass	Road	✓	Upgrade culvert

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
	Channel	✓	Channel modification
Unnamed Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Lubigi Primary #02	Road	✓	Culvert upgrade by Northern Bypass
Lubigi Secondary Channel #10A			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Northern Bypass	Road	✓	Culvert upgrade by Northern Bypass
	Channel	✓	Channel modification
Start of Wetland area	Ground	✓	End - transition of channel to wetland
	Wetland	✕	Retain wetland
Sec Channel #10	Channel	✓	Channel modification
Lubigi Secondary Channel #10B			
Start	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Sec Channel #10	Channel	✓	Channel modification

Table 2-8: Description of channel reaches and proposed works within Kansanga area

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
KANSANGA PRIMARY CHANNEL			
Start of channel	Road	✓	Upgrade access road culvert
	Channel	✓	Channel modification
Hanlon Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Gogonya Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Gaba Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Sec Channel #05	Channel	✓	Channel modification
	Channel	✕	No work to existing channel
Start Wetland area	Ground	✕	End - transition of channel to wetland
	Wetland	✕	Retain wetland
Lake Victoria	Lake	✕	Do not touch
Kansanga Secondary Channel #01			
Start at Bujiga Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Knonge Hill Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kansanga Prim #04	Channel	✓	Channel modification
Kansanga Secondary Channel #02			
Start below Gaba Rd	Channel	✓	Start - transition to channel
	Channel	✓	Channel modification and culverts
John Kiyimgi Road	Road	✓	Upgrade culvert
	Channel	✓	New Channel
Kansanga Prim #04	Channel	✓	Channel modification

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
Kansanga Secondary Channel #03			
Start #03	Channel	✓	Start - transition to channel
	Channel	✓	Channel modification and culverts

Table 2-9: Description of channel reaches and proposed works within Kansanga and Gaba area

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
Access Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kansanga Prim #04	Channel	✓	Channel modification
Kansanga Secondary Channel #04			
Start #03B	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kansanga Prim #04	Channel	✓	Channel modification
GABA PRIMARY CHANNEL			
Start #04A	Road	✓	Upgrade access road culvert
	Channel	✓	Channel modification
Access Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Wavamunno Rd	Road	✓	Upgrade culvert
	Channel	×	No work to existing channel
Start Wetland area	Ground	×	End - transition of channel to wetland
	Wetland	×	Retain wetland
Lake Victoria	Lake	×	Do not touch

Table 2-10: Description of channel reaches and proposed works within Kinawataka area

Channel Reach Descriptor	Existing Environment	Works To Be Done	Nature of Proposed Works
KINAWATAKA PRIMARY CHANNEL #06			
Start of channel	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Sec Channel #04	Channel	✓	Upgrade culvert
	Channel	✓	Channel modification
Sec Channel #03	Channel	✓	Upgrade culvert
	Channel	✓	Channel modification
Sec Channel #02	Channel	✓	Upgrade culvert
	Channel	✓	Channel modification
Kireka Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Lana Road	Road	✓	Upgrade culvert

	Channel	✓	Channel modification
Start Wetland area	Ground	×	End - transition of channel to wetland
Channel Reach Descriptor	**Existing Environment**	**Works To Be Done**	**Nature of Proposed Works**
	Wetland	×	Retain wetland
Lake Victoria	Lake	×	Do not touch
Kinawataka Secondary Channel #01			
Start at Bujiga Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Mulunga Tank Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kinawataka Prim#06	Channel	✓	Channel modification
Kinawataka Secondary Channel #02			
Start	Channel	✓	Start - transition to channel
	Channel	✓	Channel modifications
Access Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Jinja Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kinawataka Prim#06	Channel	✓	Channel modification
Kinawataka Secondary Channel #03			
Kiwabule Kyambogo	Channel	✓	Start - transition to channel
	Channel	✓	Channel modification
Industry	Development	✓	Channel modification
	Channel	✓	Channel modification
Jinja Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kansanga Prim #06	Channel	✓	Channel modification
Kinawataka Secondary Channel #04			
Start Kigoba Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Coronation Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Factory Rd	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Jinja Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Kinawataka Prim#06	Channel	✓	Channel modification
Kinawataka Secondary Channel #04A			
Start #04A	Ground	✓	Start - transition to channel
	Channel	✓	Channel modification
Kimera Road	Road	✓	Upgrade culvert
	Channel	✓	Channel modification
Ntinda Road	Road	✓	Upgrade culvert
	Channel	×	No work to existing channel
Gentex Enterprise	Road	✓	Upgrade culvert
	Channel	×	No work to existing channel
Sec Channel #04	Channel	✓	Channel modification

2.5.2 Estimated length of Roads based on the Total Lengths of Channels

Considering Lot 1 (Lubigi and Nakamiro drainage System), the total number of Kms of the drainage channels to be constructed is approximately 32km. Therefore, if access roads are to be provided on the side of the drainage channels for half the lengths, then the total number of kms of access roads would be about 16km. In reality however, the Contractors will use existing road networks to easily access various sections of the channels. While the use of existing roads (given that several sections of the drainage channels are already easily accessible by existing road network) bears positive economic implications on the project implementation, it actually makes it hard to estimate the actual lengths of the access roads required.

Overall, upgrading works such as channel expansion, realignment, lining and capacity expansion of road crossings have been designed over several channels with the total lengths of the proposed works in each of the drainage systems and combined totals presented in tables from Table 2-11 to Table 2-13

Table 2-11: Lengths of drainage channel within the Lubigi drainage System and Comparison to TOR

Design Drainage System Dimensions					
Lubigi Drainage System					
	Chainage	**Channel Total Length (km)**	**Wetland Area**	**Extent of the proposed Works**	**No work in this reach**
Lubigi Primary #2					
Old Kira Road to Gayaza	0+000m to 2+600m	2.60			2.60
Gayaza to Bwaise	2+600m to 3+700m	1.10			1.10
Bwaise / Kawaala Road	3+700m to 6+200m	1.50		1.50	
Kawala Road to Hoima Road	3+700m to 4+700m	1.00	1.00	1.00	
Hoima Road to Sentema	6+200m to 8+700m	2.50	2.50		2.50
Sentema Road to Mayanja River	8+700m to 12+100m	3.40			3.40
TOTAL Lengths (km)		**12.10**	**3.50**	2.50	**9.60**
Lubigi Secondary Channels					
Lubigi Secondary Channel #01		0.47		0.47	
Lubigi Secondary Channel #02		0.66		0.66	
Lubigi Secondary Channel #03		5.75	0.80	5.75	
Lubigi Secondary Channel #04		1.70	0.20	1.70	
Lubigi Secondary Channel #05		2.60		2.60	
Lubigi Secondary Channel #06		3.14		3.14	
Lubigi Secondary Channel #07		3.28		3.28	
Lubigi Secondary Channel #08		2.67		2.67	
Lubigi Secondary Channel #09		7.65		7.65	
Lubigi Secondary Channel #10		4.07		4.07	
TOTAL SECONDARY Lengths (km)		**31.99**	**1.00**	31.99	**0.00**

. Table 2-12: Lengths of drainage channel within the Kansanga and Gaba drainage System and Comparison to TOR

Design Drainage System Dimensions					
Kansanga & Gaba Drainage Systems					
	Channel profile description	**Channel Upgrade (Incl channel & structures)**	**Wetland Strecth Area(km)**	**Extent of the proposed Works (km)**	**No work in this reach (km)**
Kansanga & Gaba Primary #4 & #4A			1.82 km (From chainage 5+380 to 7+200)	5.380	1.82
Kansanga Primary Channel #04	Start to Hanlon Road	0.9			
	Hanlon Road to Gogonya Road	1.35			
	Gogonya Road to Gaba Road	2.40			
	Gaba Road to Lake Victoria	2.55			
Sub Total		**7.2**	**1.82**		**1.82**
Gaba Primary Channel #04A		2.83	1.05	1.78	**1.05**
TOTAL Lengths (km)		**10.03**	**2.77**		
Kansanga Secondary Channels					
Kansanga Secondary Channel #01		1.55		1.55	
Kansanga Secondary Channel #02		1.32		1.32	
Kansanga Secondary Channel #03		0.65		0.65	
Kansanga Secondary Channel #04		0.90		0.90	
Kansanga Secondary Channel #05		1.20		1.20	
TOTAL SECONDARY Lengths (km)		**8.45**		**8.45**	**0.00**

Table 2-13: Lengths of drainage channel within the Kinawataka drainage System and Comparison to TOR.

Design Drainage System Dimensions				
Kinawataka Drainage Systems				
	Channel Upgrade (Incl channel & structures)	Wetland Area	Extent of the proposed Works	No work in this reach
Kinawataka Primary #6				
Kinawataka Primary Channel #06	8.6	4.18	4.42	4.18
TOTAL Lengths (km)	**8.6**	**4.18**	**4.42**	**4.18**
Kinawataka Secondary Channels				
Kinawataka Sec. Channel #01	1.8		1.8	
Kinawataka Sec. Channel #02	1.5		1.5	
Kinawataka Sec. Channel #03	1.3		1.3	
Kinawataka Sec. Channel #04	3.0		3.0	
Kinawataka Sec. Channel #04A	1.7		1.7	
TOTAL SECONDARY Lengths (km)	**9.3**	**0.00**	**9.3**	**0.00**

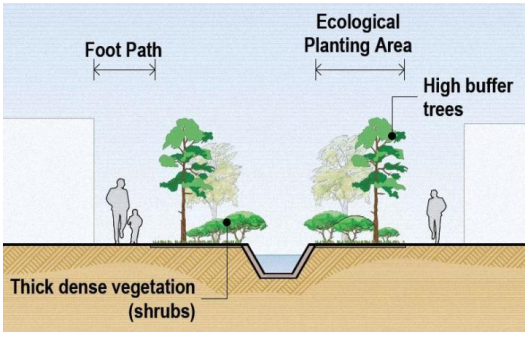
2.6 Landscape and Beautification Design

There are many options for inclusion of landscaping into the infrastructure works whether it is through a process of greening the system or through incorporating different materials into the design including gabions and loose rock fill.

It is imperative that landscaping and beautification be incorporated into the City's drainage system because it creates an opportunity for:

1. Improved aesthetics – an opportunity to make the city environment attractive.

   Water features and how they are articulated affect how people interact with them and around them. Water is often associated with cleanliness, rebirth and life. Current situation looks otherwise.



2. Creation of a community identity for Kampala.
3. Reinforcement of urban language; areas designated to specific use should be emphatic and prominent.

   Public interaction with such areas can be directed and reinforced. This can be achieved through repeated use of certain materials and design patterns.

4. Good landscaping which can help foster safety
   - Safety of the public and property from the drains
   - Safety of the drain and its assets from people and vandalism
5. Good landscaping which has been proven to result in higher real estate values.
6. Improvement of water quality if well integrated within the storm water infrastructure e.g. through the use of bio-retention swales.

A detailed report on the landscaping options that will be considered during the implementation of this Project is provided in the Appendices Report attached.

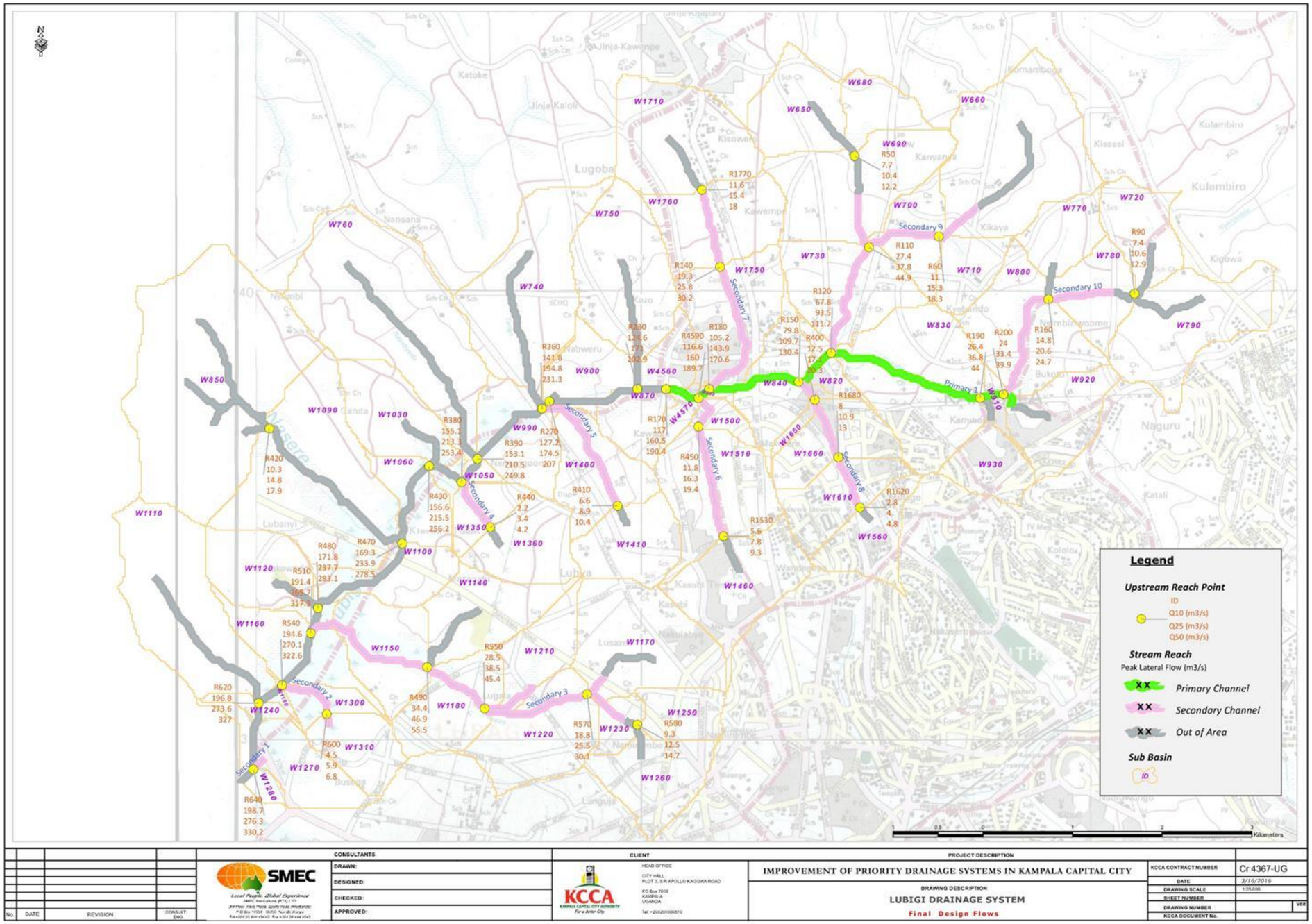


Figure 2-83: Design Peak Flows for Lubigi Drainage System

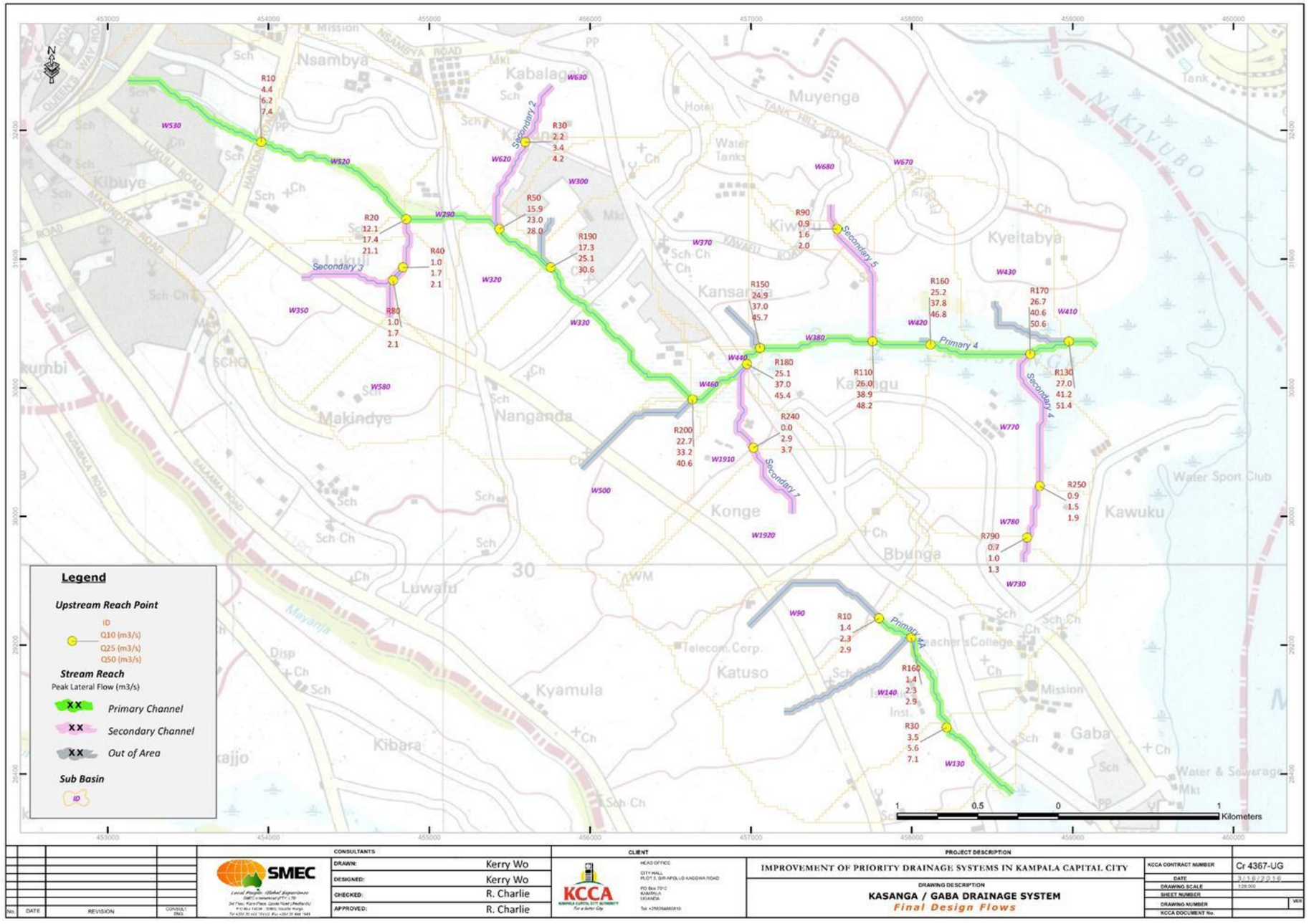


Figure 2-84: Design Peak Discharge for Kansanga / Gaba Drainage System.

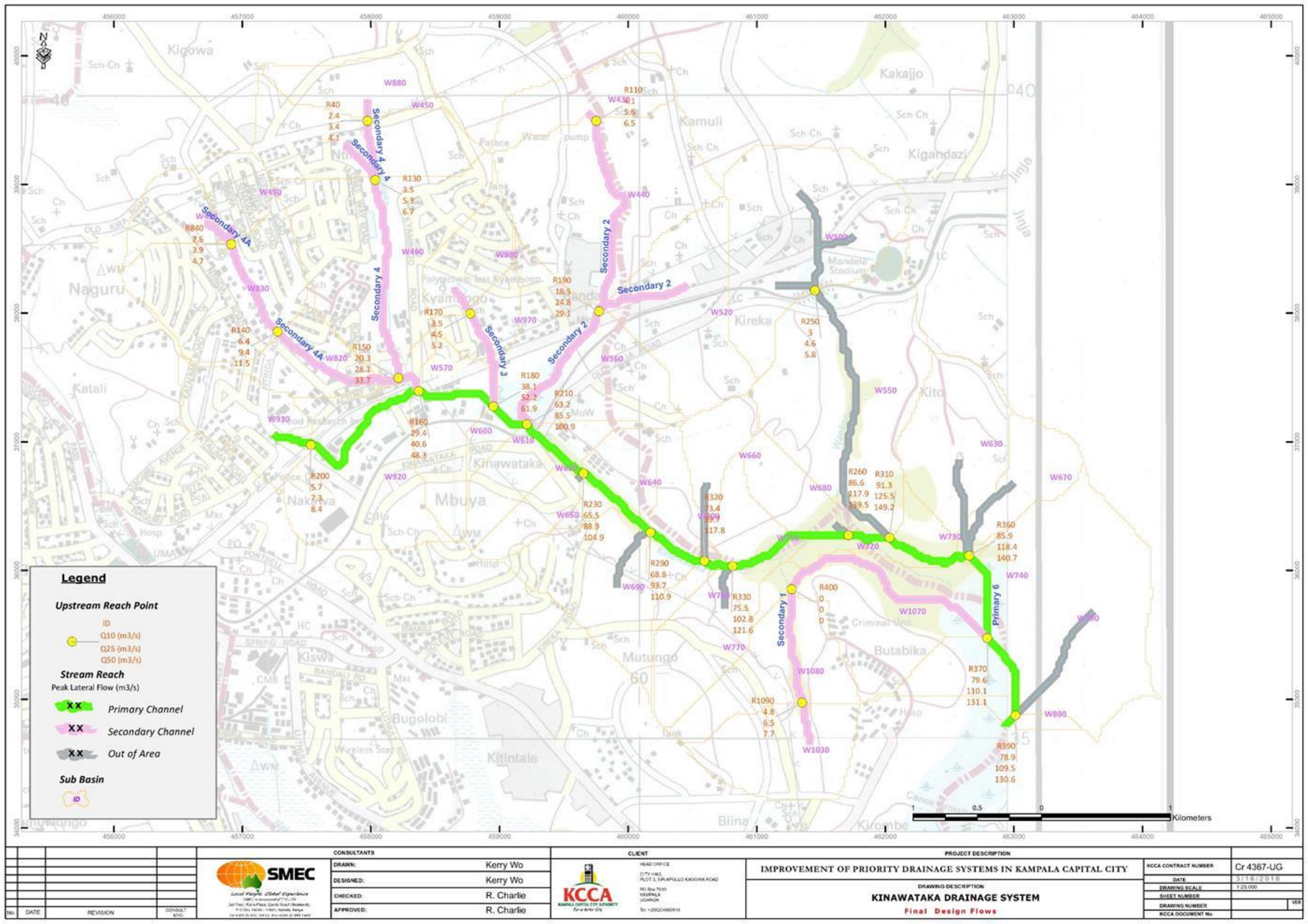


Figure 2-85: Design Peak Discharge for Kinawataka Drainage System

2.7 Construction Phase

2.7.1 Drainage Infrastructure

2.7.1.1 Culvert types

The choice for either circular or box culverts was made depending on volume of flow expected through a section or blockage observed at culvert crossings during the field visits. In addition the potential for the crossing to be used as community footpath or for vehicular traffic will feed into determining the culvert type. Field observations during inspection indicate that the existing circular culverts have enhanced the potential for blockages and effectively developed constrictions within the channels' cross sections.

2.7.1.2 Channel lining

The channel linings considered for the Project included masonry lining (stone pitching), concrete lining (Armorflex ©, Cable concrete ©) with built-in pressure facilities (especially where buoyance may be an issue), and natural lining (vegetation for stability at the side). The preferred selection will be based on the existing baseline environment and population density, channel slope, base flow sources along the channel and proximity along the channel section.

2.7.1.3 Low Flow Sections

These were considered in sections of channels which have ecology such as ducks, fish, and geese to maintain the existing conditions that support the baseline environment. Consideration for these will also be made in sections where siltation is commonplace.

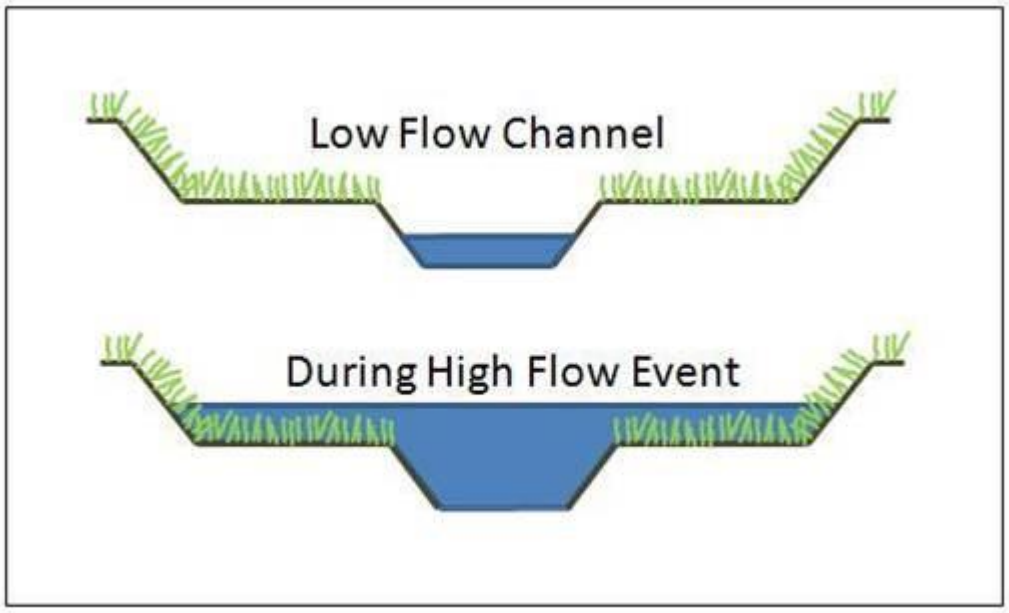


Figure 2-86: Example of low flow section

2.7.1.4 Silt traps

These were considered in sections where siltation was considerably high, resulting in blocked drains as observed during field visits. The traps are intended to reduce downstream sediment load and ultimately associated blockages due to sediment deposition. Sediment deposition is more prone to areas with reduced flow velocities for example due to reduced channel slope or increased channel width as well as garbage deposited in the channel.

2.7.2 Construction activities

The structures to be constricted include drainage channels (excavation and lining), embankments for retention ponds or inter-catchment transfer infrastructure (tunnels or deep channel), depending on the option selected for a specific area, headwalls, community access channel over-paths, culverts/bridges for road crossings and road ways.

The construction phase will comprise pegging out of the designed channel corridor extent; mobilization, re-alignment of the channels, vegetation clearance and topsoil stripping, drainage work, de-watering operations, demolition of existing structurally inadequate installations, channels' dredging and lining, earthworks, trenching operations, erosion control, replacement of drainage structures at road crossings, replacement of community channel crossings and landscaping of the improved channels. Some of the activities that will be undertaken are summarized in Table 2-14.

Table 2-14: Summary of construction activities during Project implementation

Construction operation	Activity
Mobilization	• Material Delivery and Storage • Material use • Solid waste management
Vegetation clearing/grubbing and earthwork	• Preservation of existing vegetation • Channel cross section excavation • Stockpile management • Solid waste management • Contaminated soil management
Drainage work	• De-silting basin • Sediment trap • Water diversion • Storm drain inlet protection • Drainage swales and lined ditches • Solid waste management • Contaminated soil management • Stock pile management • Channel lining (Armoflex ©, Cable Concrete ©)
De-watering operations	• De-watering operations • Providing alternative water ways for channel base flow
Culvert/bridge construction	• Material delivery and storage • Material use • Stockpile management • Water diversion • Pre-cast or in-situ concrete • Concrete waste management • Liquid waste management • Temporary channel crossing
Roadway construction	• Material delivery and storage • Material use

Construction operation	Activity
	• Stockpile management • Concrete waste management • Liquid waste management • Solid waste management • Street sweeping and vacuuming • Paving operations
Trenching operations	• Storm drain inlet protection • Stock pile management
Erosion control, and planting and landscaping	• Preservation of existing vegetation • Drainage swales / retention ponds • Outlet protection / velocity dissipation devices • Sand bag barrier

2.7.3 Construction equipment and materials

The following equipment is typically used for drainage channels' construction work:

- Excavators;
- Dump trucks;
- Concrete mixtures;
- Mobile lift cranes;
- Compactors; and
- Water Bowsers.

The following are the principal materials that will be used during the construction phase:

- Stone and concrete liner;
- Pre-fabricated slabs and culverts;
- Murram and subsoil material for filling;
- Cement, sand, gravel, boulders;
- Grates and screens; and
- Diesel fuel.

Table 2-15: Estimated construction materials required

No.	Material	Quantity
1	Stone masonry(wall) Stone masonry(bed)	79,938.73 m^3 107,316.52 m^3
2	Cable concrete Footing concrete Blinding concrete	387,570.09 m^2 52,784.7 m^3 12,653.31 m^3
3	Rock fill	32,079.29 m^3
4	Steel	2,680.42 tonnes
5	Backfill	80,194.78 m^3
6	Crushed stone (CRS)	1080.81 m^3
7	Asphalt	144.11 m^3

Table 2-16: Estimated Material quantities disaggregated by the primary drainage channels

Item	Unit	Volume	Volume	Volume
		Lubigi	**Kansanga & Gaba**	**Kinawataka**
Excavations	**m^3**	655,410	89,100	282,060
Shaping od channels	**m^2**	3,136	6,523	800
Cross bed Rock	**m^3**	32,079	30,051	4,420
Culverts	**m**	704	201	150
Concrete	**m^3**	69,255	26,617	56,000
Cable Concrete	**m^2**	387,570	663	100,682
Walkway	**m^2**	152,379	28,347	63,000

Any construction material from quarries will be obtained preferentially from a licensed source and in accordance with any terms of the license. “Licensed” means approved by NEMA or the District Local Government (for any other location). The procured contractor will provide a copy of the license to KCCA before the beginning of works at the material extraction location.

2.7.4 Construction waste management

All waste generated from the construction activities will be categorised as either hazardous or non-hazardous. Non-hazardous wastes are those that do not exhibit any hazardous properties and are relatively low risk to human health and the environment; examples are food, packaging, plastics and wood. Hazardous wastes are materials that can potentially be harmful to human health and/or could potentially damage the natural environment if not managed and disposed of appropriately; examples include pit latrine sludge, dredged silt contaminated with raw sewage, oils and solvents.

All waste will be managed to ensure protection of the environment and human health. Waste management activities will be performed in accordance with the following waste hierarchy principles:

i) Reduce the quantity of waste generated by process or design change, improved management of products and/or best practice procurement strategies;
ii) Reuse materials where possible either within the project or within the wider community;
iii) Recycle materials where practicable (e.g. metal cans and plastic bottles) to reduce the quantity of wastes disposed;
iv) Recover as much as possible from wastes; and
v) Responsible treatment and disposal, including appropriate chemical, biological and thermal treatment to reduce hazards and long term impacts on the environment, and landfilling at approved sites.

Although the waste management industry is evolving in Uganda, at present there are limited options particularly in terms of recycling and recovery. It is thus expected that the majority of generated waste will be landfilled. Only qualified and certified waste management companies will be engaged to handle the hazardous waste.

The following waste is anticipated from drainage channels construction activities:

- Vegetation;
- Packaging (paper, plastics, wood);
- Dredged silt and disposed waste from the channel
- Stone pitched liner debris and other demolition waste;
- Concrete;

- Solid domestic waste (incidental amounts arising from site personnel); and
- Sewage from construction personnel.

There will be no routine servicing of vehicles, plant or machinery at the construction site; all servicing and repairs will be completed at the contractor's yard and all resulting waste will be managed by that facility.

Waste will be collected and stored temporarily at site, separated according to type; there will be no mixing of hazardous waste (if generated) with non-hazardous waste. Waste will be removed from site by a licensed contractor, and waste transfer notes will be filed and retained for audit. Portable toilets for construction personnel will be located at site and will be regularly emptied by a licensed contractor.

The excavated materials from the channels, that have been determined to be non-hazardous, will in the short term (1-2 years), be desposed of at Kitezi landfill from where they are used as cover materials. It is anticipated that as Kitezi Landfill reaches its full capacity, KCCA will divert all excavated materials to the new Dundu landfill which is planned to be established in Mukono District, from where they will also be used as waste cover material. The wet excavated materials can be a nuisance to road users if immediately transported after excavation as they drain soily water on the road, traffic and pedestrians. To abate this issue, excavated materials will be temporarily stockpiled for a day to drain before they are loaded onto the haulage trucks. Regular monitoring shall be made by KCCA safeguards specialists and the Supervising Consultant to ensure maximum compliance by the Contractor.

Excavated clay materials will be stockpiled at Dundu landfill site awaiting use as the base material when construction of the landfill commences. It will be vital as the clay barriers to be generally used as liners and capping materials to isolate potentially polluting waste from the surrounding environment. This way, the excavate clay materials will help to minimise the potential impact of the landfill on the environment including the migration of leachate into the acquiffers and spoliation of the water resources. Besides, use of the excavate clay materials will reduce the impact of landfill on other wetlands during the construction process - associated with excavation of clay for use as liners.

Any waste determined to be hazardous will be appropriately handled by a NEMA registered waste contractor. Samples of material excavations will be taken for laboratory tests to confirm the levels of contamination with heavy metals. The Contractor will be required to take samples at different sections of the channels where pollution is most suspected, and the parameters for the sample analysis will be agreed between the safeguards teams prior based on the character of the area and potential sources of contamination.

Materials to be excavated will mostly include clay soils, some silt and solid waste. The proposed project is estimated to result in large volumes of excavated materials as presented in Table 2-17. The estimated construction materials to used used during the implementation of the projectare presented in Table 2-15, whereas the equipment and human resources requirements are further presented in Table 2-18 and Table 2-19 respectively.

Table 2-17: Estimates of excavated materials

Channel Name	**Excavated Material Estimates (m^3)**	
Lubigi Primary	286,000	
Lubigi Secondary Channels	1,14000	
Sub total		**400,000**
Kinawataka Primary	138,000	
Kinawataka secondary channels	166,200	
Sub total		**304,200**
Kansanga and Ggaba	200,000	**200,000**

Total		**904,200**

Equipment Requirements

Table 2-18: Equipment to be used during project implementation

No.	Equipment Type and Characteristics	Minimum Number required
1	Excavator, min 165 hp	5
2	Wheeled front end loader, min 130 hp, bucket 2 m3	4
3	Tracked front end loader, (Traxcavator) min 130 hp	2
4	Bull Dozer, min 160 hp	1
5	Low bed truck, min capacity 20 ton	1
6	Tipper trucks, min capacity 15 ton	20
8	Concrete agitator trucks	5
9	Concrete vibrator 32-60 mm diameter	10
10	Mobile crane, min capacity 25 ton	2
11	Mobile crane, min capacity 3 ton	2
12	Flat bed lorry, min capacity 15 ton	3
13	Flat bed lorry, min capacity 7 ton	2
14	Air compressor, 6.0 – 7.5 m^3/min complete with attachments including a jack hammer	2
15	Water pumps 10 – 40litres/sec	8
16	Motor grader complete with scarifier, min 130 hp	2
17	Motorised vibrating roller, unballasted dead weight 10 ton	4
18	Pedestrian operated roller, unballasted dead weight of 1 ton	3
19	Water bowser, min capacity 5 m^3	2
20	Pre-mixed asphalt paver, min cap 120 hp	1
21	Pneumatic roller, unballasted dead weight 10 tons	1
22	Sets of Survey and setting out equipment of up-to-date technology	2

2.7.5 Personnel

Construction activities will largely be undertaken by contractors, who will employ a staff estimated at potentially between 400 and 500 persons.

Contractors shall be selected partially based on their HSE performance and their level of compliance with Ugandan laws, HSE standards and World Bank Safeguard policies. Suitably qualified individuals within the areas where the channels are located will be given preference. Working with the locals will eliminate the need to provide for accommodation of the construction personnel, but rather plan for personnel to commute to work from their homes.

A number of skilled personnel will be employed on the project to provide their technical and professional competences towards the successful completion of the project.

Table 2-19: The Various skilled personnel likely to be employed on the project

No	Position
1	Contract Manager
2	Project Engineer
3	Materials Engineer
4	Quantity Surveyor
5	Site Surveyor
6	Senior Foreman
7	Senior Materials Technologist
8	Equipment Manager
10	Environmental/Safety Officer

2.8 Operation and Maintenance

Operation and Maintenance of the drainage channels will not form part of the construction program but will be the platform for longevity of the drainage channels. As part of the design process, an Operation and Maintenance Manual is to be prepared which will consider pertinent factors such as:

- Channel de-silting programs;
- Removal of debris and rubbish from the drainage channels and disposal off site; and,
- Regular inspections and repairs where necessary to structures.

2.9 Project Alternatives

2.9.1 General Description and Assessment of Project Alternatives

Six (06) options were identified during the feasibility studies for the channel designs. The identified options were taken through a more rigorous assessment before selection of the preferred alternatives was done. The options identified were:

Option 1: Do Nothing Scenario

Option 2: Buy back the flood plain

Option 3: Retain / buy back areas for retention ponds in the upper reaches of individual catchments

Option 4: Combination of buy back the floodplain and retention within channel

Option 5: Channelization

Option 6: Inter Catchment Transfer

The assessment of alternatives was based primarily on the suitability of the alternatives in the various catchments and channel locations. Factors considered during the evaluation were:

iv. Technical suitability (applicability of the option to provide the desired outcome of improving storm water drainage within and around the Project area);
v. Environmental considerations (potential benefits and adverse effects);
vi. Social considerations (potential impact on the people living within and around the Project area); Economic viability of implementation of the option.

Table 2-20 presents the advantages and disadvantages of each of the identified options considered.

Table 2-20: Advantages and disadvantages of applying the identified option within the drainage catchment

OPTION	ADVANTAGES	DISADVANTAGES
Option 1 - Do Nothing Scenario.		
This option is in equal measure the "No Project option" which implies that the proposed project should not be implemented.	• Capital expenditure is minimal with no change to the current level of operations. • Savings from the-would be costs incurred during the implementation of the proposed project. • Potential impacts and risks from the implementation of the project such as vegetation clearance, noise, dust and exhaust emissions, etc., would not occur.	• No change to the level of flooding in the affected areas; • Health issues remain and public health / standard of living would actually deteriorate further causing additional expenditure on health and other social issues; • Continued criticism on KCCA due to the lack of action undertaken to resolve the issues; • Socio-economic outcomes such as creation of job opportunities, may be lost
Option 2: Buy back the flood plain.		
Resuming (buying back) all properties located within designated flood line and paying resumption and compensation costs. Assumedly, this option would require the establishment of alternative areas for affected people to relocate to.	• Need agreement on the level of flood immunity to be provided, situation based on providing flood immunity to the Q_{10} level. • Flood flows would be able to pass through the area without impacting the lives of local residents (up to the level of flood protection adopted). • General health and well-being of residents would improve due to relocation away from the unhealthy environment (i.e. residing adjacent to open sewers) with potential reduction in expenditure on health and other social issues. • The area acquired could be cleared and landscaped with public open areas / public park areas developed as illustrated.	• Major relocation plan required for affected people within the area resumed requiring a substantial development program for alternative housing. • High capital expenditure to acquire the identified flood affected area with resulting need for a major resettlement program.

Table 2-20: Advantages and disadvantages of applying the identified option within the drainage catchment

OPTION	ADVANTAGES	DISADVANTAGES
		
Option 3: Retain / buy back areas for retention ponds in upper reaches of individual catchments.		
This option would involve establishing retention ponds in areas of open land such as farmland, grassland and wetlands. This arrangement would reduce the peak discharge into the drainage channels sections located downstream of the retention pond areas.	• Reduction in flood peak discharge reducing flood impacts downstream; • Reduction to flood control works / infrastructure downstream; • Potential for the area of land if previously used for agriculture to be farmed with the knowledge that no compensation for any damage or loss of income due to flood; 	• Costs to purchase areas of open land such as farmland and grassland; • Costs to establish flood control works such as flood levees and outlet control infrastructure; • Potential loss of agricultural land and objections to acquisition due to loss of income; 

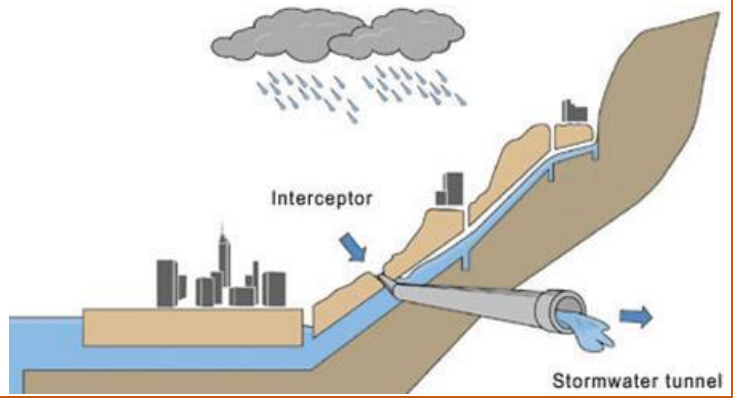
Table 2-20: Advantages and disadvantages of applying the identified option within the drainage catchment

OPTION	ADVANTAGES	DISADVANTAGES
Option 4: Combination of buy back the floodplain and retention within channel.		
Within these badly flood affected lands, the option of setting up retention ponds within the areas resumed would be considered.	• Land and building resumption is undertaken only in the most affected flooded area; • Reduction in flood peak discharge reducing flood impacts immediately downstream and thereby lessening the costs of channelization works immediately downstream; • General health and well-being of residents would improve due to relocation away from the unhealthy environment (i.e. residing adjacent to open sewers) with potential reduction in expenditure on health and other social issues; • The area acquired could be cleared and landscaped with public open areas / public park areas developed as illustrated. 	• Size of retention ponds is small due to topography (i.e. steeper channel slopes in the upper reaches); • Realistically, the pond could only be created by constructing an embankment across the channel and then remodelling the resulting "wedge shaped" area upstream of the constructed embankment; • High capital expenditure to acquire the identified flood affected area with resulting need for a significant resettlement program.
Option 5: Channelization.		
This option looks at conveying the entire flood discharge from the	• Flood flows would be able to pass through the area without impacting the lives of local residents (up to the level of flood immunity adopted).	• Significant relocation plan required for affected people within the corridor of land along the adopted drainage channel alignment requiring a large development

Table 2-20: Advantages and disadvantages of applying the identified option within the drainage catchment

OPTION	ADVANTAGES	DISADVANTAGES
contributing catchments through the drainage channel system to the ultimate downstream discharge point (i.e. the end of the secondary channel discharge point). This option will require construction of infrastructure works along each of the drainage channels including expansion of the drainage channel dimensions, lining of channels and the provision of "in-line" structures such as culverts and bridges and silt traps / ponds.	• General health and well-being of residents would improve due to relocation away from the unhealthy environment (i.e. residing adjacent to open sewers) with potential reduction in expenditure on health & other social issues; • Access to the areas would be improved by construction of channel access roads, which will also provide for equipment access for channel maintenance; • Limited potential for landscape along the drainage channel corridor apart from work adjacent to the channel and within the road area; • Potential accidents within and round the channel can easily be minimized, for example by fencing (i.e. keep humans out of the drainage channel and potentially prevent drowning); 	program for alternative housing; • High capital expenditure to acquire the identified corridor of land required to construct the infrastructure (channels and structures (such as culverts, bridges and crossings); • Channelization can potentially alter the local ecosystem environment since the storm water is conveyed through the entire channel system, minimizing the potential for recharge within a given catchment. • Considering the quality of water that flows through storm water channels in the City, there is a potential to cause a deterioration of the water quality of the receiving water bodies.  
Option 6: Inter Catchment Transfer.		
This option considers diversion of part or all of the flood discharge to an	• Flood flows would be able to pass through the area downstream of the identified point of diversion without impacting the lives of local residents (up to the level of	• High capital expenditure to construct the diversion which would normally take the form of a tunnel or open channel (type and dimension depends on

Table 2-20: Advantages and disadvantages of applying the identified option within the drainage catchment

OPTION	ADVANTAGES	DISADVANTAGES
adjacent catchment thereby reducing the flood impacts downstream of the point of diversion. As the option operates under gravity flow conditions, the diversion would usually be via tunnel or deep channel excavation. The point of diversion is critical to successful operation: • Divert too high in the catchment means little diversion for major costs; • Divert too low in the catchment means larger diversion discharges & upstream channelization with higher costs.	flood immunity adopted). • The catchment upstream of the catchment under consideration could be resumed (land bought back)and all existing infrastructure removed and the area landscaped to provide accessible common area land with potential for flood routing which combined with the diversion would significantly reduce discharge in the channel downstream of the diversion. • General health and well-being of residents would improve due to relocation away from the unhealthy environment (i.e. residing adjacent to open sewers) with potential reduction in expenditure on health and other social issues.	topography); • Significant relocation plan required for affected people upstream of the point of diversion requiring a large development program for alternative housing; • If and where channelization is undertaken, the channel would be fenced and access to the provided access road would be limited to residents unless agreement is reached for local residents to access such roads. 

2.9.2 Evaluation of Alternatives

The various options identified in Section 2.9.1 cannot be applied to each and every drainage channel due to geographic location, population density, current land use, and drainage infrastructure requirements. The options identified are considered to be the options that can best be applied to the primary and secondary channels. For tertiary and quaternary channels, the options applicable would differ.

In consideration of the general nature of the secondary channels within the three (3) catchments, the following generalisations for channel profiles and land use activities were applied;

- Channels with sections of steep slopes which would require protection and/or lining the bed and banks of the channel;
- Channels with sections of average to flat slopes which could require the installation of sediment capturing devices;
- Land use within the general vicinity through which the channel passes can be considered as open area and/or agricultural land use;
- Areas through which the channel passes can be described as:
    - Slum areas;
    - General housing;
    - Commercial;
    - Industrial

In addition to the generalised selection criteria listed above, recognition was given to the on-going development of road and drainage designs for the proposed Kampala-Jinja Expressway and the proposed Kampala Southern Bypass projects to be implemented through a future Public – Private Partnership (PPP) process; the implementation of the proposed Light Rail project alignment, all proposed for development within the Kinawataka drainage system. The footprints for the major road and rail infrastructure development projects basically encompass the Kinawataka drainage system. These developments were considered during the selection of options for the drainage project.

Table 2-21 summarises the applicability of each of the identified options on the channels within each of the three (3) drainage systems.

✓ indicates that the option is applicable within the catchment in consideration.
✕ indicates that the option is not applicable within the catchment in consideration.

Table 2-21: Summarises the applicability of each of the identified options on the channels within each of the three (3) drainage systems.

Drainage System / Drainage Channel	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
LUBIGI DRAINAGE SYSTEM						
Lubigi Primary Channel #02						
• Start Confluence with Secondary Channel #10	✓	✓	×	×	✓	×
• Secondary Channel #10 to Gayaza Road Roundabout	✓	×	×	×	✓	×
• Gayaza Road Roundabout to Bwaise Roundabout	✓	×	×	×	✓	×
• Bwaise Roundabout to Kawaala Road overpass	✓	×	×	×	✓	×
• Kawaala Road overpass to Bombo Road roundabout	✓	×	×	×	✓	×
Lubigi Secondary Channels						
• Secondary Channel #01	✓	✓	×	✓	✓	×
• Secondary Channel #02	✓	✓	×	✓	✓	×
• Secondary Channel #03	✓	✓	✓	✓	✓	×
▪ Secondary Channel #03A	✓	✓	×	✓	✓	×
▪ Secondary Channel #03B	✓	✓	×	✓	✓	×
• Secondary Channel #04	✓	✓	×	×	✓	×
• Secondary Channel #05	✓	✓	×	×	✓	×
• Secondary Channel #06	✓	✓	×	✓	✓	×
• Secondary Channel #07	✓	✓	×	✓	✓	×
• Secondary Channel #08	✓	✓	✓	✓	✓	×
• Secondary Channel #09	✓	✓	✓	✓	✓	×
▪ Secondary Channel #09A	✓	✓	✓	✓	✓	×
▪ Secondary Channel #09B	✓	✓	✓	✓	✓	×
▪ Secondary Channel #09C	✓	✓	✓	✓	✓	×
• Secondary Channel #10	✓	✓	✓	✓	✓	×

Table 2-21: Summarises the applicability of each of the identified options on the channels within each of the three (3) drainage systems.

Drainage System / Drainage Channel	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
▪ Secondary Channel #10A	✓	✓	✓	✓	✓	×
▪ Secondary Channel #10B	✓	✓	✓	✓	✓	×
KANSANGA DRAINAGE SYSTEM						
Kansanga Primary Channel						
• Primary Channel #04	✓	✓	×	✓	✓	×
Kansanga Secondary Channels						
• Secondary Channel #01	✓	✓	×	✓	✓	×
• Secondary Channel #02	✓	✓	×	✓	✓	×
• Secondary Channel #03	✓	✓	×	✓	✓	×
• Secondary Channel #04	✓	✓	×	✓	✓	×
GABA DRAINAGE SYSTEM						
Gaba Primary Channel						
• Primary Channel #04A	✓	✓	×	✓	✓	×
KINAWATAKA DRAINAGE SYSTEM						
Kinawataka Primary Channel						
• Primary Channel #06	✓	✓	✓	✓	✓	×
Kinawataka Secondary Channels						
• Secondary Channel #01	✓	✓	×	×	✓	×
• Secondary Channel #02	✓	✓	×	✓	✓	×
• Secondary Channel #03	✓	✓	✓	✓	✓	×
• Secondary Channel #04 – *Eastern channel*	✓	✓	✓	×	✓	×
• Secondary Channel #04A – *Western channel*	✓	✓	×	×	✓	×

2.9.2.1 Option 1: Do Nothing Scenario

The "Do Nothing Scenario" is in equal measure the "No Project option" which implies that the proposed project should not be implemented. Under this scenario, the extent of flooding that currently occurs within the catchment will continue to happen with the situation becoming worse over time as the catchment continues to become even more developed due to the demands of providing additional housing within easy access to Kampala City.

The basic premise of this alternative is that the potential adverse environmental and social impacts envisaged to result from the implementation of the proposed project will be avoided. This scenario would also translate into savings from the costs likely to be incurred from the project implementation – that can be invested in alternative productive ventures. In particular, it was conceived that due to a combination of both the opposition to loss of land likely to be encountered from the industrial complexes such as Kyambogo industrial estate; and generated claims for compensation for process disruption of businesses, loss of revenue and severity of access, combined with potentially high costs associated with the required procurement of land to adequately address the construction of storm water drainage systems.

However, the "Do Nothing Scenario" was considered unsustainable because the multiple benefits from implementing the proposed project would be foregone. In particular, this would mean that issues associated with frequent devastating floods such as pollution of receiving water bodies, damage to property and city infrastructure, loss of human lives, disease outbreaks, and paralysis of transportation city-wide would prevail while positive impacts such as job openings and safety for the local population along the channels would not occur. On this basis, the 'Do Nothing Scenario' was rejected as an option to be carried forward for the Project and project implementation option was maintained.

2.9.2.2 Option 2: Buy back the flood plain

This option takes into consideration that majority of the areas in the City that are currently experiencing floods are in the flood plains. Kampala is generally a City built on hills and it is therefore natural that the low lying areas receive storm water from the catchments. In the recent past, the development of Kampala has been unplanned, resulting in development of areas that are naturally meant to be floodplains.

The basis of this option was to ensure minimal engineering works in terms of infrastructure development to control floods in the low-lying parts of the city, while allowing these low-lying areas to recover their original functions as floodplains.

However, implementation of this option would involve relocating people that are currently residing in the areas that are designated as 'flood plains'. On assessing the potential to implement this option, Table 2-21 shows that it could be implemented on majority of the channels. However, the areas being considered are already developed; some with industrial complexes such as Tirupati Business Park along the Northern Bypass and the Ntinda industrial area within the Kinawataka catchment as well as high cost residential areas in Kansanga catchment. This would require extremely high compensation costs since the people living and working within these areas would have to be relocated or given cash compensation. Thus this option was rejected to pave way for further evaluation of applicable options 3, 4, 5 and 6, due to the aforementioned high potential socio-economic impact. This is best reflected in Secondary channel 3 in Lubigi catchment, (see table below) whose area of flooding totals to about 0.86 km^2.

Land use classifier	Type	Area (ha)	% of Area	Compensation Rate ($/m^2)	Compensation Amount ($)
Open areas	I	59.1	68.9%	12.50	$7,387,500
Open areas with housing	II	3.2	3.7%	15.00	$480,000
High density housing	III	23.5	27.4%	30.00	$7,050,000
TOTAL		**85.8**			**$14,917,500**

Source: Feasibility Study Report, KDIIP II, SMEC, 2016

2.9.2.3 Option 3: Retain / buy back areas for retention ponds in upper reaches of individual catchments

This option would involve the creation of retention ponds in the upper reaches of the catchments with the aim of reducing the peak discharge into the drainage channels downstream of the retention ponds, and thus minimize on the frequency of flooding within the lower areas of the catchment which are more prone to flooding during storms.

Development of flood retention ponds would also result in a reduction in the volume of outflow discharges into the downstream channel sections. This will have the desired effect of minimising the extent of channelization work required along the channel downstream of the retention pond i.e. reduced channel size and smaller culvert dimensions at road crossings.

In addition, the use of retention ponds would provide a natural filtering system and thus improve on the quality of water to be conveyed through the channels downstream, and eventually into larger water bodies such as Lake Victoria for the Kansanga and Kinawataka catchments and Lake Kyoga for the Lubigi catchment. Thus this option has potential social and environmental benefits.

On assessing the potential to implement this option, Table 2-21 shows that it could be implemented in a few of the sections within the Project area such as the section between the confluence with secondary 10 and Lubigi Primary, Secondary channels 3, 9 and 10 within Lubigi catchment and the Kinawataka Primary channel and Secondary channels 3 and 4 within Kinawataka catchment. Nonetheless, similar to Option 2, this would require extremely high compensation costs since the people living within these areas would have to be relocated or given cash compensation. The associated high compensation costs would render the Project unviable. For this reason, this option was rejected and options 4, 5, and 6 were evaluated for consideration.

2.9.2.4 Option 4: Combination of buy back the floodplain and retention within channel

This option would involve the creation of retention pond areas along the secondary drainage channels which are most affected by flooding during storms. The retention effects would reduce the discharge downstream resulting in reduced levels of flooding, thus lessening the resumption requirement downstream of the retention facility. Similar to option 3, the use of retention ponds would provide a natural filtering system and thus improve on the quality of water to be conveyed through the channels downstream, and eventually into larger water bodies such as Lake Victoria for the Kansanga and Kinawataka catchments and Lake Kyoga for the Lubigi catchment. Detailed discussion of the advantages and disadvantages of the option is presented in Table 2-20.

Notwithstanding these advantages, the economic assessment of this option found that similar to Options 2 and 3, this would require extremely high compensation costs since the people living within these areas would have to be relocated or given cash compensation thus rendering the Project unviable. As a result, this option was rejected for further consideration of options 5 and 6.

2.9.2.5 Option 5: Channelization

Table 2-21 shows that this option was considered for all the channels within the Project areas. This option would involve conveying the entire flood discharge from the contributing catchments through the drainage channels up to the ultimate downstream discharge point. Depending on the state of the existing channels in the Project area, implementation of this option could involve widening, deepening and/or straightening, of the channels, replacement of road culverts, replacement of channel crossings, and establishment of access roads along the channels, among others.

This option carries with it several environmental implications associated with adverse impact on the water table and risk of induced encroachment on surviving wetlands systems. However, implementation of this option in the Project area will come with benefits as summarized in Table 2-20 which will achieve the ultimate aim of this Project i.e. reduction of the flooding occurrences within the Project area to as low as possible, and hence eliminate the dangers that follow the flooding that usually takes place after storms in the City.

The economic assessment of this option found it less costly than options 2, 3, and 4 because while it also involves relocation and compensation costs, these are comparatively less and hence rendering the project more economically viable. Based on this option's suitability for all project areas, manageability of the associated potential environmental and social impacts, financial feasibility and cost-effectiveness, it was taken on for application in the entire Project area. The option was considered with some variations in application depending on the catchment characteristics as explained in Section 0.

2.9.2.6 Option 6: Inter Catchment Transfer

This option would involve diversion of part or all of the flood discharge to an adjacent catchment that is considered to be less prone to the effects of flooding. Table 2-21 shows that there are no suitable adjoining catchments where inter-catchment transfer can be made to work without shifting the problems from one bad catchment situation into another catchment which is in an equally bad, or even worse situation. Only Secondary channel 6 in Lubigi catchment was considered for this option but even then, the high capital investment required to construct the diversion tunnel or open channel was found to be too high due to the required implementation technology. Based on the technical and social implication, this option was rejected.

2.9.2.7 Summary of Option evaluation

Table 2-22 provides a summary of the results of the evaluation of options discussed in the above subsections.

Table 2-22: Summary of results of evaluation of options

Option	Channels for which option was considered	Channels for which option was selected for implementation	Reason
Option 1: Do Nothing Scenario	All primary and secondary channels	None	All the benefits of the Project will be foregone
Option 2: Buy back the flood plain	All primary and secondary channels	None	Most floodplains have been developed;

Option	Channels for which option was considered	Channels for which option was selected for implementation	Reason
			therefore implementation would require very large compensation costs. This would make the Project unviable.
Option 3: Retain / buy back areas for retention ponds in upper reaches of individual catchments	Lubigi Primary (Sec 10 to Gayaza Road Roundabout); Sec 3, Sec 9, Sec 10, Kinawataka Primary; Sec 3, Sec 4,	None	Cost of land in Kampala is very high. Retaining land for retention ponds in the City would incur very high compensation costs, thus making the Project unviable.
Option 4: Combination of buy back the floodplain and retention within channel	All primary and secondary channels	None	Cost of land in Kampala is very high. Retaining land for retention ponds in the City would incur very high compensation costs, thus making the Project unviable.
Option 5: Channelization	All primary and secondary channels	All primary and secondary channels	This option will bring the much-needed relief to the flooding problem, and with costs that make the Project economically viable. This option had the least requirement for land take and therefore least social impact. The option also put into consideration the environmental aspect since channelization into wetlands was avoided.
Option 6: Inter Catchment Transfer	Lubigi Sec 6	None	There are no suitable adjoining catchments where inter-catchment transfer can be made to work without shifting the problems from one bad catchment situation into another catchment which is in equally as bad

Option	Channels for which option was considered	Channels for which option was selected for implementation	Reason
			situation.

Note: Considering the environmental benefits associated with the use of retention ponds within the catchments, and the fact that options 3 and 4 (that require retention ponds) were rejected purely on the basis of the amount of compensation that would be required; the use of retention ponds at the sites identified as suitable during the design studies should be put into consideration for implementation in the near future as funds to enable relocation become available. This will enable an integrated solution to the City's drainage problems since the addition of retention ponds into the selected catchments will serve to further minimize the occurrence of flooding, as well as greatly contribute to the improvement of the water quality that eventually feeds into the receiving streams.

2.9.3 Details of selected Option 5

The option of channelization was selected as the optimal choice for the entire Project area. The drainage channel designs were standardised with the only variables within the channel being the lining, side slopes, depth and base width of the channel. Open channels were selected for application in the Project area.

Open channels within drainage systems have advantages over closed drainage systems in terms of:

- Lower capital costs to construct;
- Continuous collection of surface runoff in to the channels; and
- Ease of access for maintenance purposes.

Factors that were considered when choosing the configuration of a constructed open channel include:

- Existing and likely future channel conditions immediately upstream and downstream of the channel in question;
- Existing and long-term (i.e. full catchment development) hydrologic conditions, including pollutant and sediment loadings. This situation of full catchment development has almost been reached in every catchment in and around Kampala;
- Local site constraints such as width restrictions, amount of sediment carried in the runoff, land ownership, existing services, and location of natural and constructed features. This is a very critical issue within Kampala due to the extent of high density housing constructed up to the edge of the drainage channel in many areas;
- Recognised environmental values;
- Aesthetics and landscaping of the overbank environment;
- Likely impact of channel surcharge (i.e. overbank flows). This is a major issue in and around Kampala as overbank flow causes localised flooding;
- Long-term ecological requirements of the channel, including aquatic and terrestrial habitat and corridor values;
- Existing and likely future community expectations;
- Safety risks to the public and maintenance personnel;
- Maintenance access requirements.
- The number, location and type of channel crossings (e.g. pedestrian and motorcycles) required along the course of the open channel;
- The interconnectivity with road layouts and the number and type of road crossings;
- The type of in-situ natural material / soil through which the channel passes;
- the slope of the channel and associated velocities; and

- Potential erosion and erosion protection infrastructure within the drainage channels.

Channel Alignment

In the majority of instances, the intent is to retain the existing alignment where possible to minimise the amount of disruption along the drainage channels. In the open areas where there are severe meanderings within the existing drainage alignments, realignment of the drainage channel was considered to optimise conveyance efficiency.

Channel Sections

Channel lining can be generated from a range of locally available materials, each with its own input requirements such as labour and materials which obviously impact on the costs to implement and he time taken to construct. The generalised type of channel linings that could be utilised consists of the following:

- Concrete lining;
- Masonry and rock riprap lining;
- Brick / tile lining to bed and banks using such materials as:
  - Armorflex©
  - Cable Concrete©

Different channel linings were selected based on the generalised concept highlighted in Table 2-23.

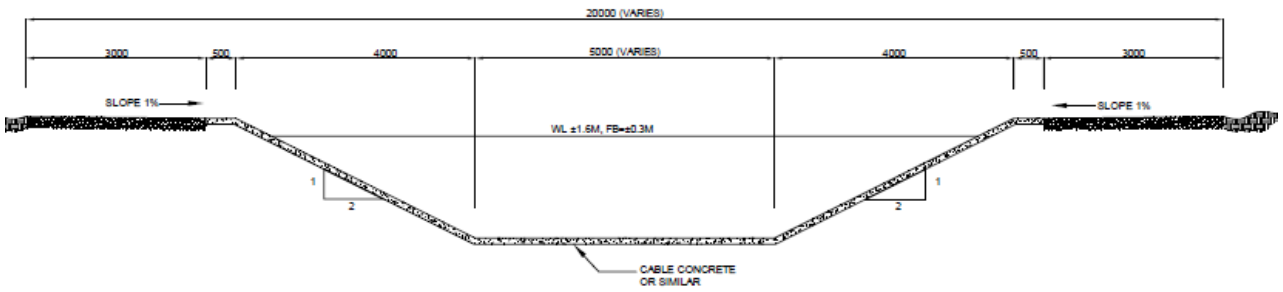
Table 2-23: General concept for choosing type of channel lining

Open areas	Earth trapezoidal channels with lining provided as required dependent on slopes and associated velocities;
Steep slope areas	Trapezoidal channel sections with steep side slopes – almost reaching the point of being vertical;
High density residential areas	Almost vertical side slopes to trapezoidal channel sections to minimise width and associated land requirement

Figure 2-87 to Figure 2-89 show the sections at which the different linings will be applied in the Project area, while the typical detailed Engineering design drawings for the channels are presented in the appendices.

Table 2-24: Different types of channels to be applied in the Project

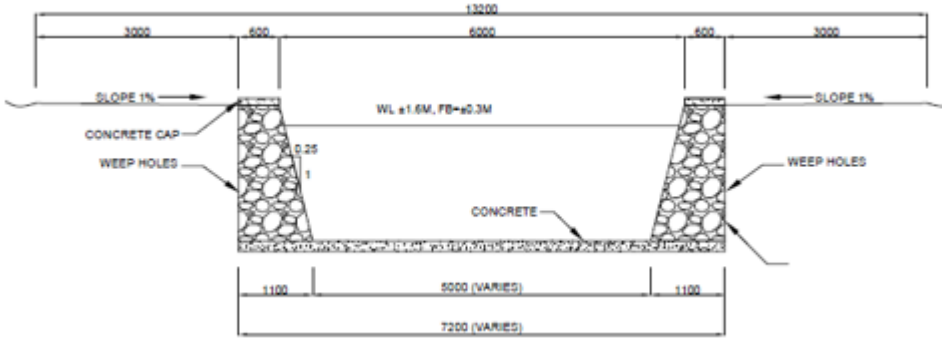
Type 1: ***Hard lined trapezoidal channel***



Features of a Type 1 lined trapezoidal channel:

- Limited water quality benefits
- Good hydraulic efficiency
- Bank slopes of usually about 1 (Vertical) to 2 (Horizontal)
- Machinery can travel along the base of the channel without causing any damage to the bed of the channel.

Type 2 **Masonry lined channel**

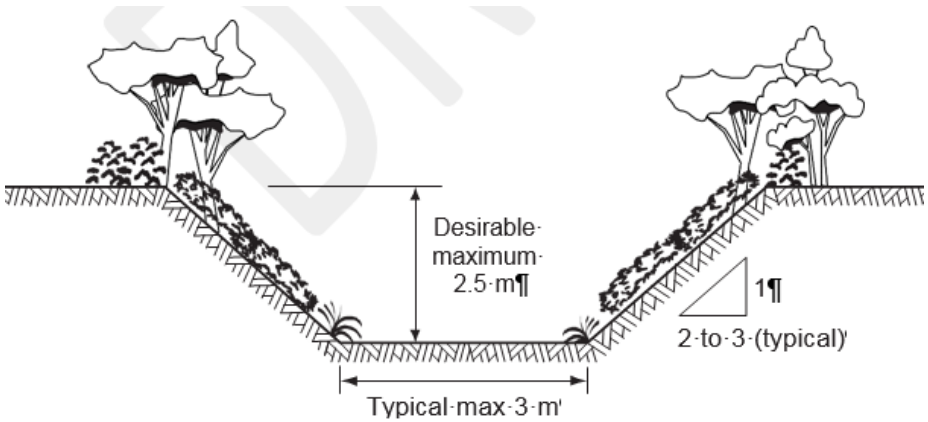


Features of a Type 2 masonry lined channel:

- Limited water quality benefits
- Good hydraulic efficiency

- Minimal width required for the channel with side slopes of 4 (Vertical) to 1 (Horizontal)
- Machinery can travel along the base of the channel without causing any damage to the bed of the channel.

Type 3 Vegetated trapezoidal channels



Typical features of a Type 3 channel include:

Channel banks vegetated with appropriate shrubs and under storey plants to provide desired hydraulic conveyance, public safety and wildlife habitat. Large trees generally should not be placed within the channel, unless located in an area of low velocity.

Channel vegetation should not be dominated by grasses, even though some grasses and other ground covers will be required for scour control.

The full bed width acts as the low-flow channel and may incorporate a pool-riffle system. Maintaining suitable bed conditions over the long-term may become impractical once the bed width exceeds 3 m, but exceptions do exist.

Desirable maximum depth of around 2.5 m.

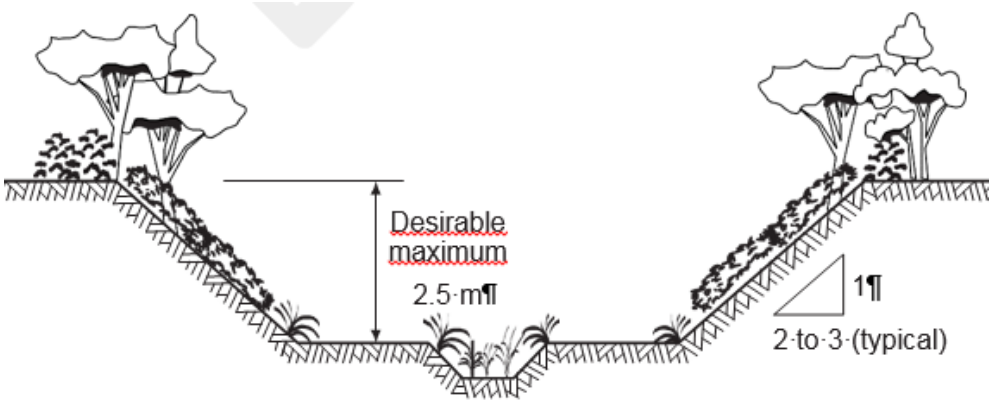
Maximum channel depth may be limited by maintenance requirements. Rock protection is usually required along the toe of the banks.

Public safety is generally addressed through the appropriate design and maintenance of bank and overbank (riparian) vegetation.

Bank slopes of 1 in 2 to 1 in 3 (V:H) may be used provided appropriate bank vegetation is established to address public safety issues (i.e. woody vegetation with limited grass cover).

Bank slopes steeper than 1 in 2 are generally not recommended.

Desirable overbank maintenance berm width of 4.5 m on at least one side of channel.



Typical features of a Type 4 channel include:

A well-defined low-flow channel forms part of the channel bed to assist in base flow passage and control soil moisture levels across the remaining channel bed. Unless the low flow section is constructed out of hard finish material (i.e. concrete etc.), the low-flow channel may meander across the channel bed and may incorporate a pool-riffle system.

Channel banks vegetated with appropriate shrubs and under storey plants to provide desired hydraulic conveyance, public safety and wildlife habitat. Large trees generally should not be placed within the channel, unless located in an area of low velocity. Channel vegetation should not be dominated by grasses, even though some grasses and other ground covers will be required for scour control.

Desirable maximum channel depth is 2.5 m, otherwise potential excessive erosion and vegetation damage occurs during high flows and/or excessive sedimentation occurs during low flows.

Bank slope requirements as for Type 3 channel.

The low-flow channel usually requires rock stabilisation to maintain stability. Rock protection may also be required along the toe of the banks.

Vegetative shading of the low-flow channel is highly desirable.

Woody vegetation may need to be limited to the channel banks if hydraulic capacity is critical. This can result in the development of an undesirable, high-maintenance channel requiring regular vegetation clearing.

Desirable overbank maintenance berm width of 4.5 m on at least one side of channel, but typically both sides.

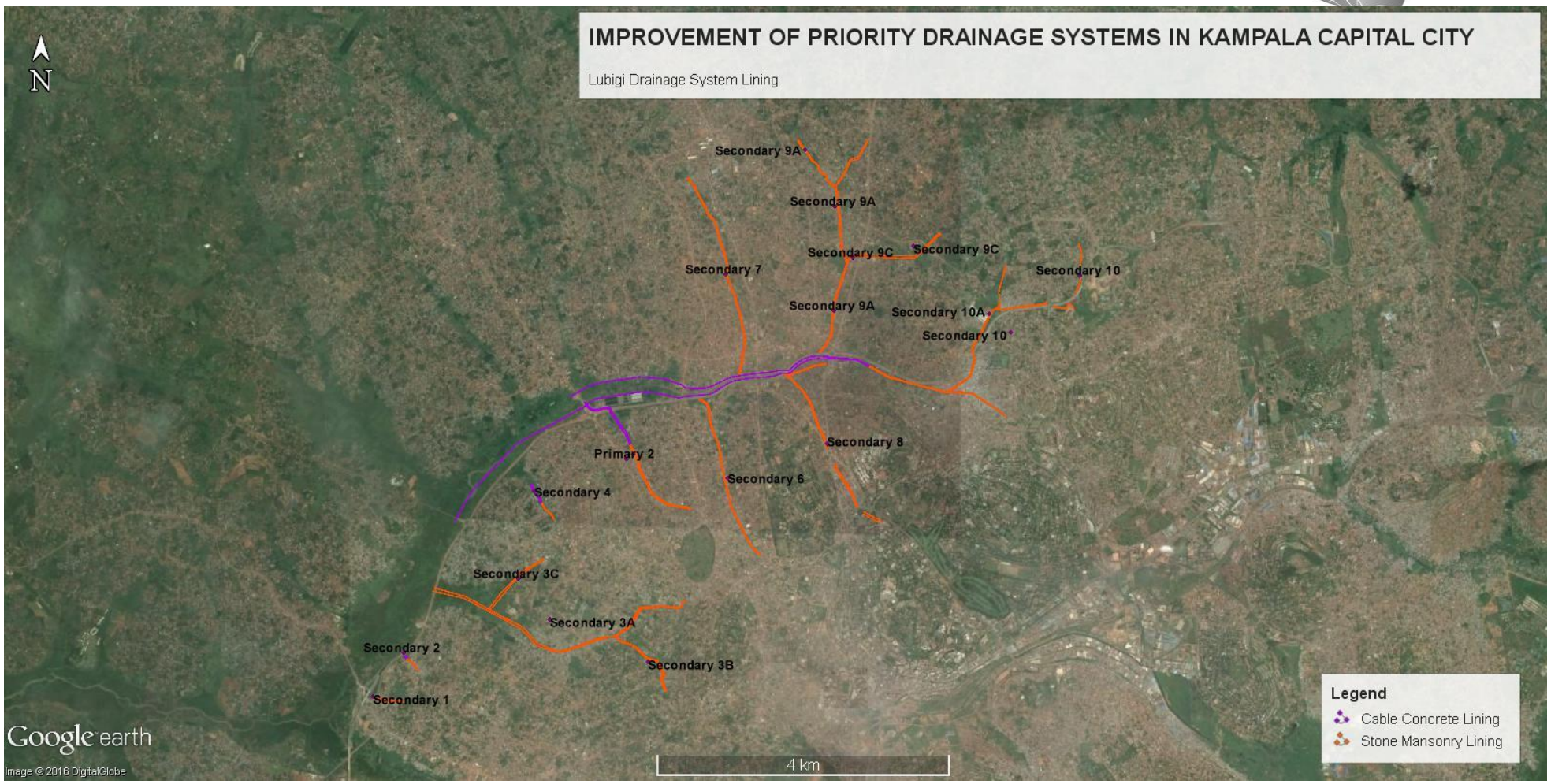


Figure 2-87: Proposed channel lining - Lubigi system

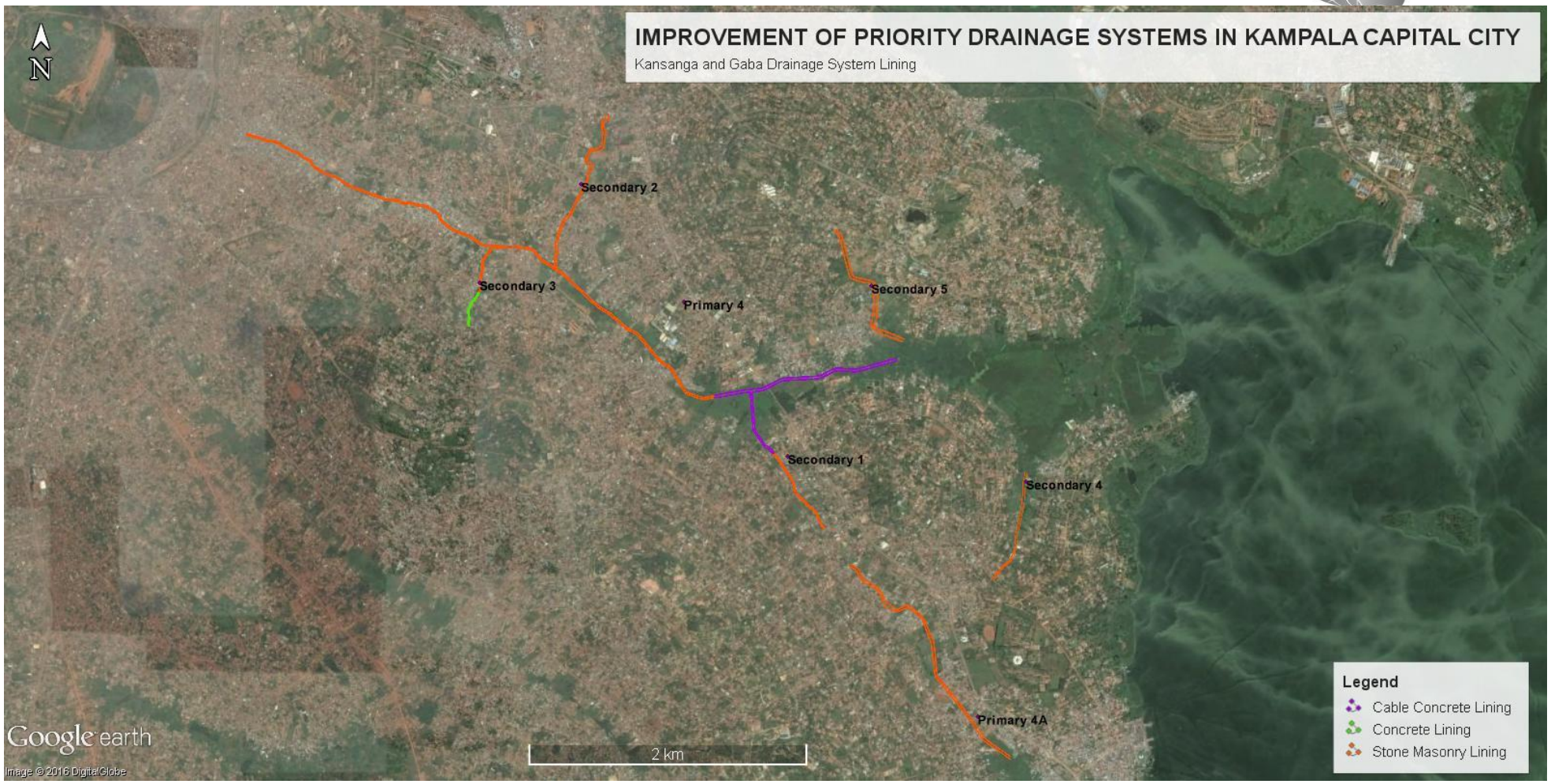


Figure 2-88: Proposed channel lining - Kansanga and Gaba System

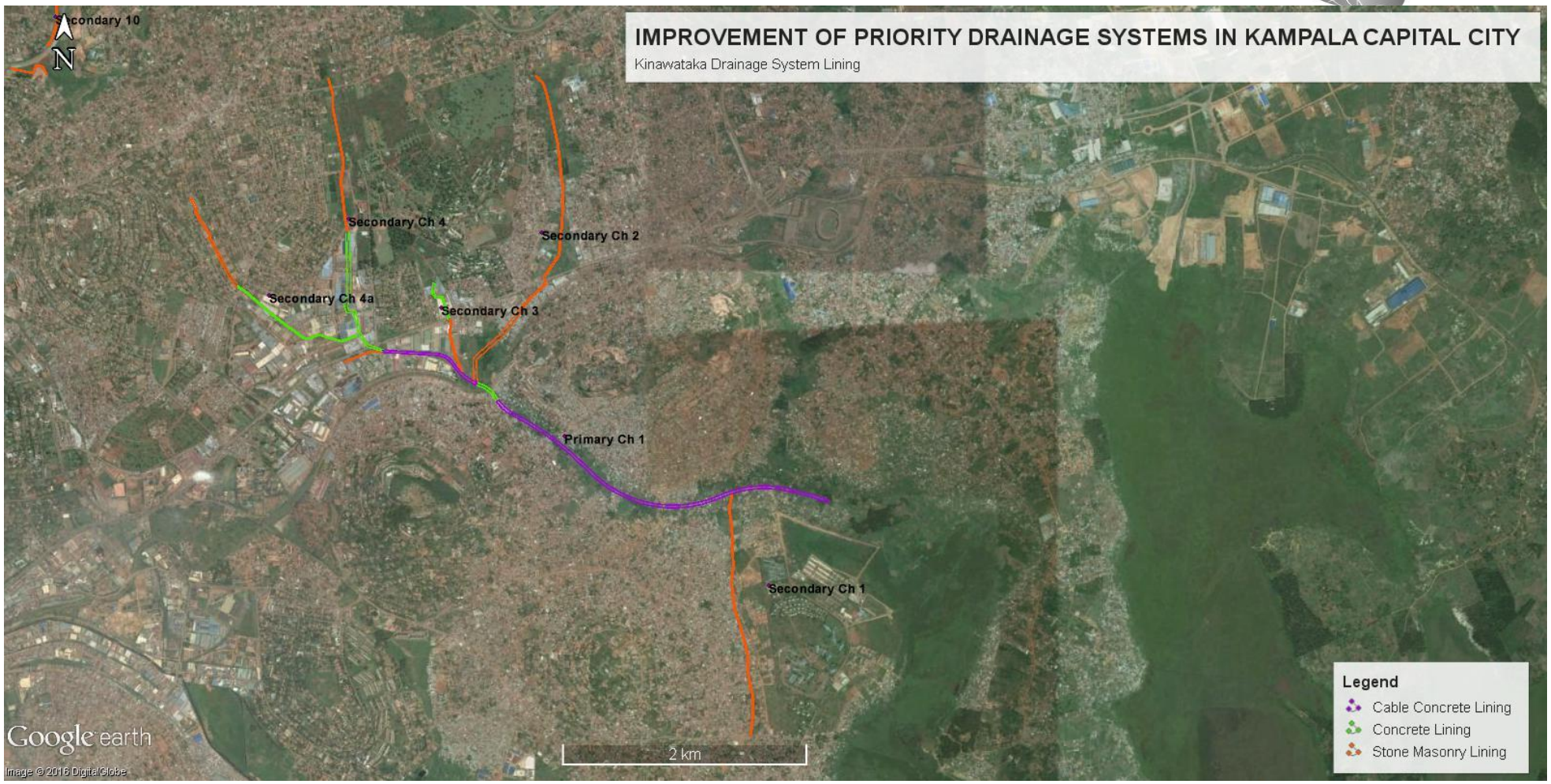


Figure 2-89: Proposed channel lining - Kinawataka system

2.10 Other on-going Projects within the Project Area

2.10.1 Kampala-Jinja Expressway

The proposed Kampala - Jinja Expressway infrastructure by Uganda National Roads Authority (UNRA) totally absorbs the Kinawataka Drainage system with elevated roads, railway works, interchanges all superimposed onto Q_{100} capacity drainage works. This proposed major infrastructure work will overlay the full alignment of the Kinawataka Primary Channel #06 as well as and the lower sections of Secondary Channels #01, #02 and #04 of the Drainage Improvement project Scope of Works.

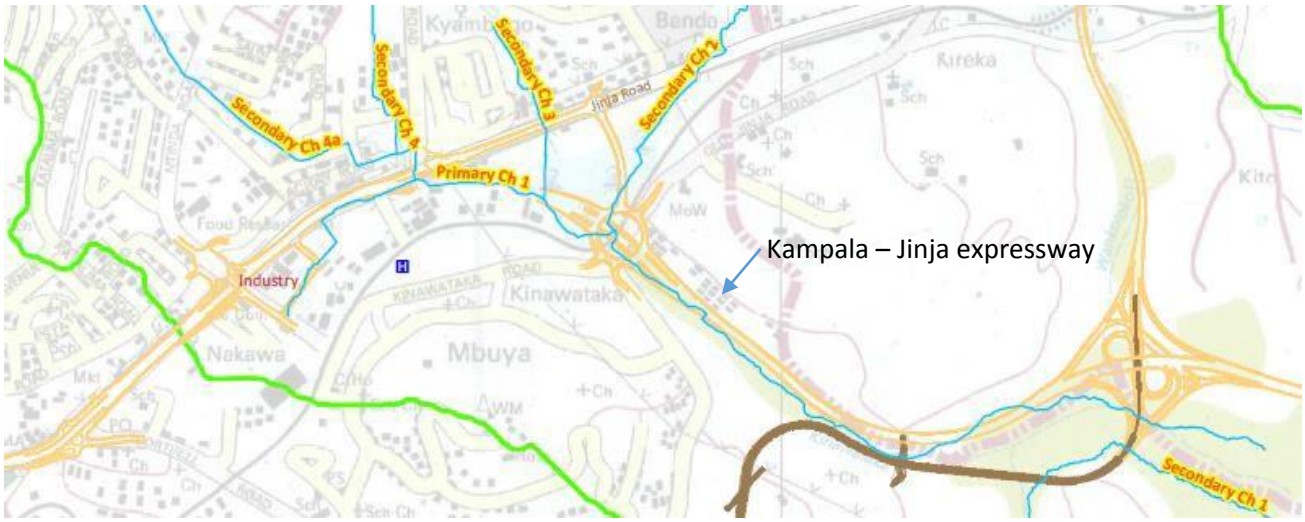


Figure 2-90: Kampala-Jinja Expressway overlain on Kinawataka Drainage.

2.10.2 Kampala Southern Bypass

The alignment for the proposed Southern Bypass infrastructure by UNRA has changed from that originally proposed resulting in less of a footprint over the existing Kansanga drainage system. The current proposal is illustrated in Figure 2-93. The additional drainage infrastructure requirements which will have to be implemented as part of the Southern Bypass implementation will involve crossing for Secondary Channel #05, a crossing for Kansanga primary channel and a culvert crossing of the southern on / off ramp for the un-named road.

Figure 2-91: Channel alignment on Kampala-Southern Bypass through Kansanga

It is also obseved that the Uganda Railway Corporation (URC) is in the process of establishing an EPC contract for the regional railway. The alignment for the proposed upgrade to the reginal railway is along and through the same corridor as the Kampala– Jinja Expressway.

2.10.3 Standard Gauge Railway

The URC data for the new Standard Gauge Rail project was made available to SMEC on 13 October 2015 and was reviewed to assess if there were any additional impacts to the drainage alignment within the Kinawataka System. It was subsequently found that the alignment for the SGR project bears no impact on the drainage project as the track runs parallel to and set well away from the Kinawataka drainage channel.

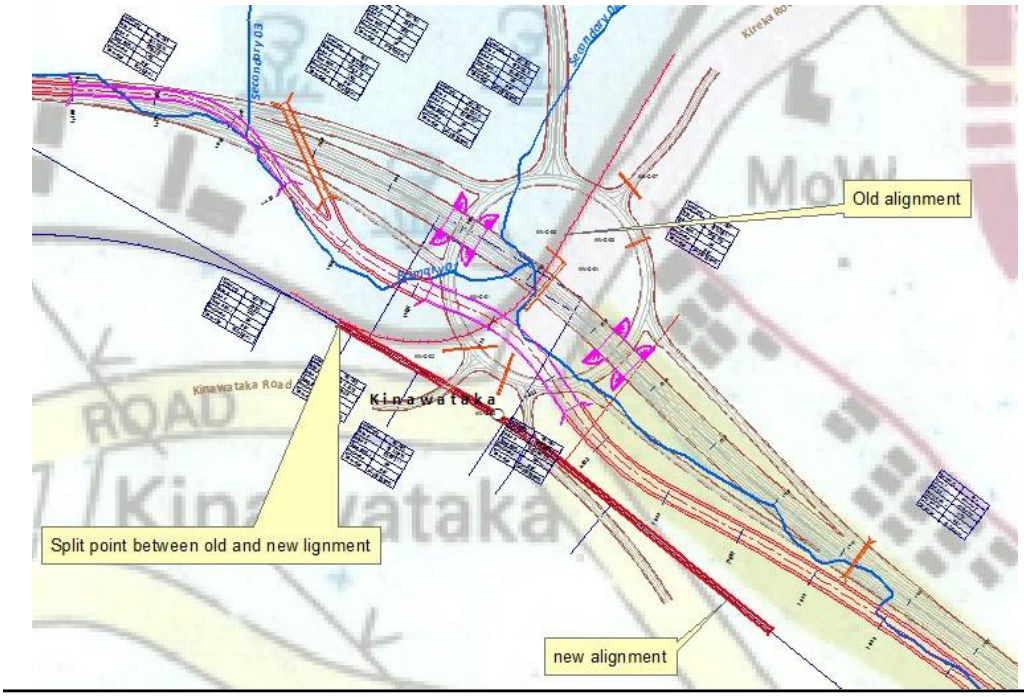


Figure 2-92: Standard gauge Railway alignment through Kinawataka Wetland

There is no impact envisagedat the time of preparing this report for the drainage channel at the Kampala - Southern Bypass interchange as the rail alignment is well offset form the drainage channel.

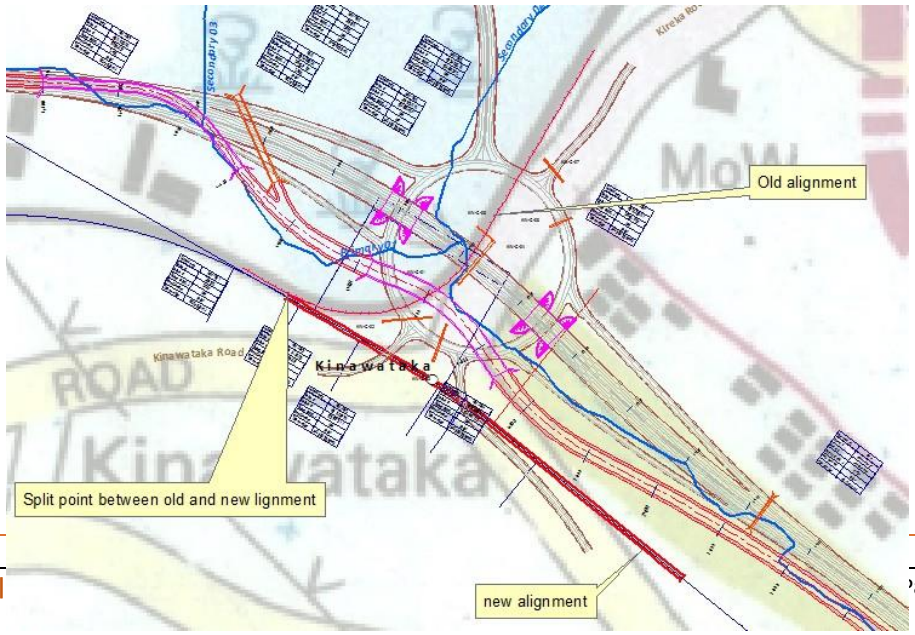


Figure 2-93: Standard Gauge Railway alignment at Southern Bypass Interchange

2.10.4 Kampala Northern Bypass Expansion

UNRA is currently undertaking the expansion of the Kampala Northern bypass to have dual carriage. The expansion is on-going along the entire route of the bypass, from Busega to Bweyogerere. A number of channels within the Lubigi catchment cross or even connect to the Northern bypass road drains as discussed in Sections 2.3.1 to 2.3.3.

2.10.5 Some of the other Running Projects under KCCA

As part of infrastructure development in Kampala City, KCCA is undertaking or planning to undertake a number of improvements of roads and signalising of road junctions, some of which projects interact with sections of the proposed drainage project. Under KIIDP II project, some of the sub project components and how they interface with the priority drainage improvement project sites are summarised in Table 2-25 below;

Table 2-25: Some KIIDP II infrastructural projects and how they interface with priority drainage sites

	Sub Project Sites	**Interacts with this Project directly?**
	BATCH I Roads and Junctions (Ongoing)	
	Fairway Junction	No
	Kiira Road	No
	Mambule Road	No
	Bwaise Junction	Yes
	Makerere Hill Road	Yes
	Bakuli-Nakulabye-Kasubi Road	No
	BATCH II Roads and Junctions (Planned)	
Lot 1	John Babiha/Acacia Avenue (1.75 km)	No
	Nakawa – Ntinda road (2.8 km)	Yes (Kinawataka catchment)
	Kulambiro Ring Road (4.7 km)	No
Lot 2	Kabuusu – Kitebi - Bunamwaya Road (8.5 km)	No
	Lukuli Road (7.8. km)	No
Lot 3	New Port Bell Road (6.7 km)	No
	Old Port bell Road/ Spring Road (3.4 km)	No
	Sir Apollo Kaggwa Road (3.4 km)	

Despite immense financial constraints, Kampala Capital City Authority has made strides in making improvements on some of the tertiary drains in the city (see Table 2-26) using the Government of Uganda funding. Works on these tertiary drains is not part of this (Priority Drainage Improvement) project. Whereas the pace at which improvements on the tertiary system is slow due to limited budget allocation, it is expected to make some relative positive impact in terms of hydraulic efficiency on the improved priority drains through reduction in the flow of silt and garbage from the catchments.

Table 2-26: Some of the tertiary drains currently under construction by KCCA

1 TERTIARY CHANNEL	DIVISION
Lubuga I (350m)	MAKINDYE
Lubuga II (620m)	
Kanakulya (434m)	
Mugerwa (417m)	
Ganafa (327m)	
St. Benedict & Kabungu Close (469m)	
Kibuye-Police-Hollywood (450m)	
Nte Yaffa (269m)	LUBAGA
Chwa II 'Nakulabye' (235m)	
Chwa II 'Namungoona' (299m)	
Kiwunya roadside RHS & LHS (790m)	
Kiwunya-Nasma (300m)	
Kawempe-Ttula I (882m)	KAWEMPE
Kawempe-Ttula II (509m)	
Kaddugala (409m)	
St. Denis (900m)	MAKINDYE
Nalweyiso (204m)	
Kabaluka (202m)	
Nakinyuguzi (818m)	
Nabunya (482m)	LUBAGA
Kimera (330m)	
Luwombo (180m)	
Nyanama drain (430m)	
Nyanama crossing (25m)	
Gabungs-Kazo Angola (440m)	KAWEMPE
Nsamba-Kazo Angola (181m)	
Yelemia-Kazo Angola (234m)	
Lutunda (560m)	
Ssekenge (525m)	
Mathel (200m)	
Bajabaseka drain & crossing (470m)	

3 ESIA METHODOLOGY

With the guidance of the NEMA-approved terms of reference, a detailed environmental and social impact assessment was carried out for the proposed drainage improvement works.

The methodology used consisted of a review of Uganda's legal and institutional arrangements, regulations and policies and those of the World Bank and international best industry practice. Baseline measurements were conducted to determine the biological and physical environment characteristics, identify impact receptors and their relation to projects sites. Consultations with various stakeholders, as determined necessary for the Project were held.

Key activities under this task included:

- Description of the Proposed Drainage Works;
- Review of ESIA study reports relating to similar projects or those within same geographical location;
- Review of Environmental and Social Scoping Report prepared at the Project's feasibility stage;
- Consultation with National Environmental Management Authority (NEMA) and other relevant government agencies;
- Review of policies, legislation and administrative framework;
- Description of the environmental setting;
- Public participation;
- Identification, analysis and assessment of potential environmental impacts;
- Preparation of Environmental and Social Management Plan (ESMP) for Impact Mitigation and Monitoring; and
- Preparation of Environmental and Social Impact Statement.

3.1 Establishment of Baseline Physical Environment

3.1.1 Water quality

Considering the potential impact of drainage channels within the Project area due to their interaction with the larger hydrological basins in Lakes Kyoga and Victoria as highlighted in Section 5.2.1.6.1, a water quality assessment of the existing conditions was undertaken to provide a baseline for future studies on the Project.

Figure 3-1: Multiparameter water quality meter (HANNA HI 9828) used to measure up to 13 different water parameters

Water quality sampling was conducted at selected locations along the drainage channels within the Project area. The sampling locations were selected on the basis of their representation of the catchment characteristics.

Collected samples were stored at 4°C and transported to NWSC laboratory in Bugolobi for biological and physio-chemical analysis the following day. In situ measurements of some physio-chemical characteristics were undertaken with a multi-probe water quality meter (HANNA HI 9828) as shown in Figure 3-1 and Figure 3-2 . Sampling locations are shown in Figure 3-4.

Figure 3-2: Collection of a water sample along Secondary 06 in Lubigi

Figure 3-3: On-site analysis of a water sample along Primary 4A in Gaba

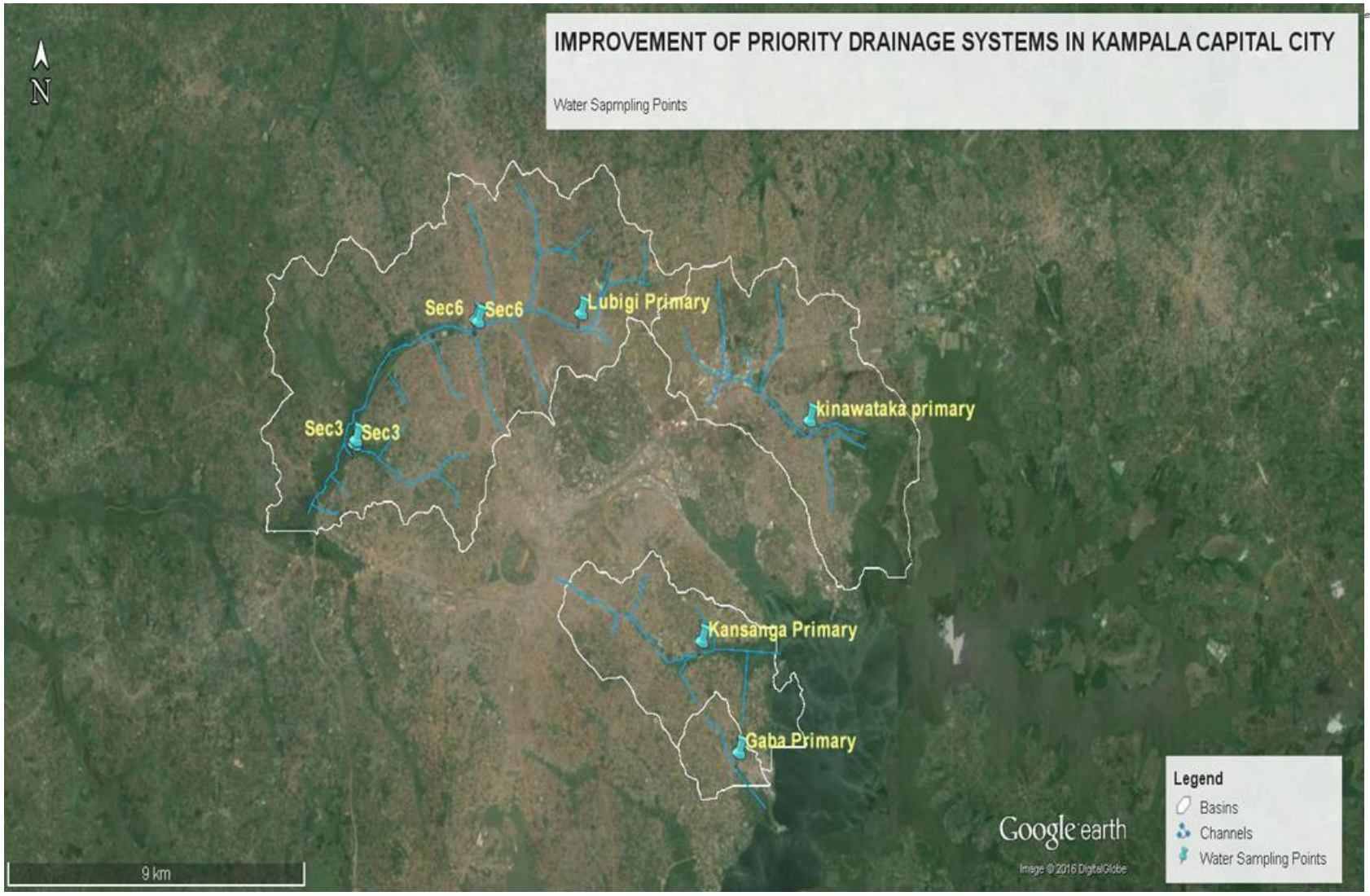


Figure 3-4: Water sampling locations within the Project area

3.1.2 Air quality

Baseline air quality was measured using a pair of digital MX6 iBrid™ portable gas meters (Industrial Scientific-Oldham) and a Microdust 880 nm digital aerosol monitor (Casella®) (*Figure 3-5*). Measurement points or locations (Figure 3-7) were selected basing on presence of potential receptors as a result of Project implementation.

Figure 3-5: Digital CASELLA microdust (L) and 6-gas MX6 iBrid™ meters(R) used to measure air quality

Figure 3-6 shows some of the locations at which measurements were taken while Figure 3-7 shows the locations of all measurement points.

Figure 3-6: Measurement of ambient noise and air quality near potential receptors near the channels

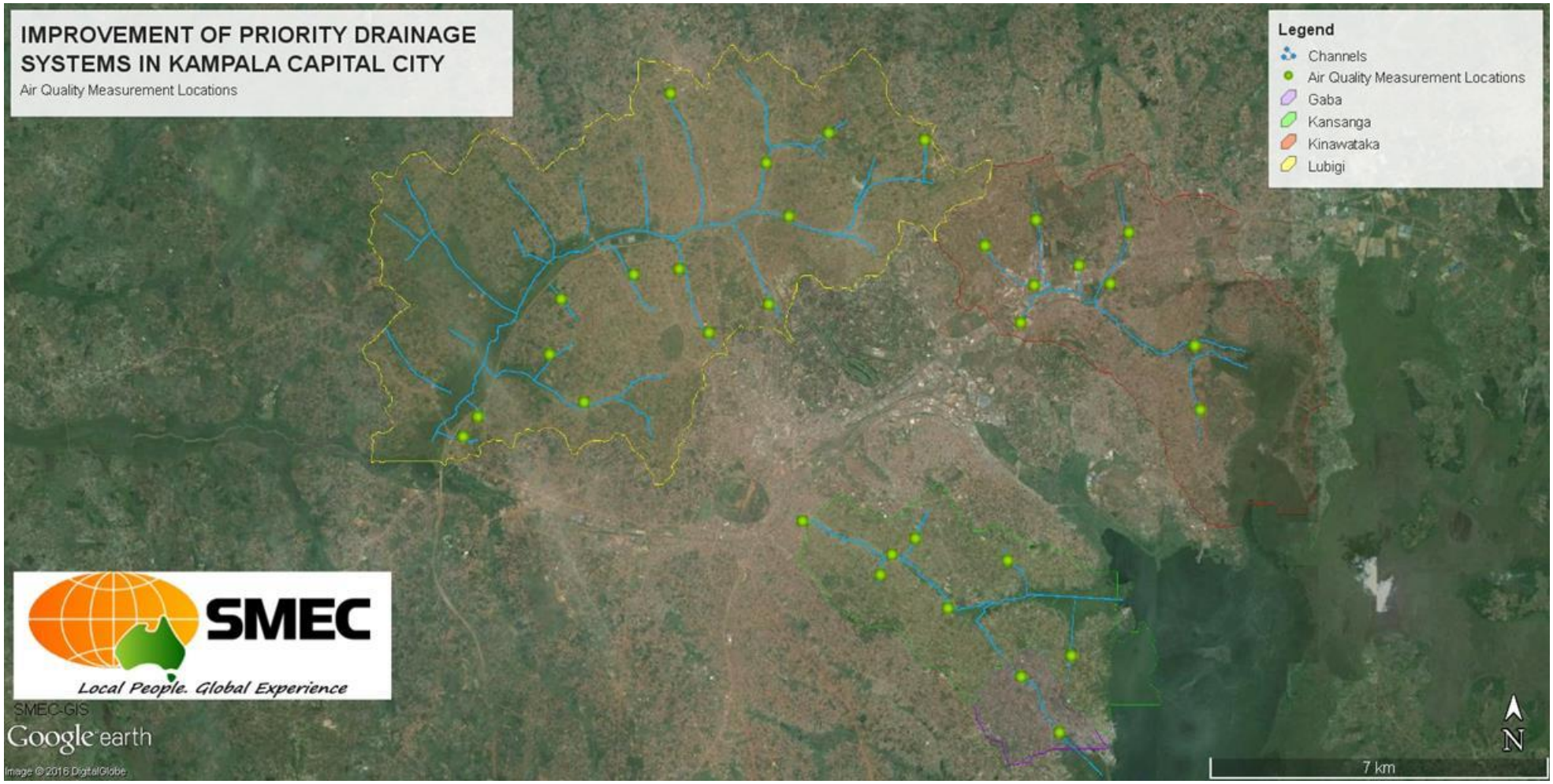


Figure 3-7: Air quality measurement locations within the Project area

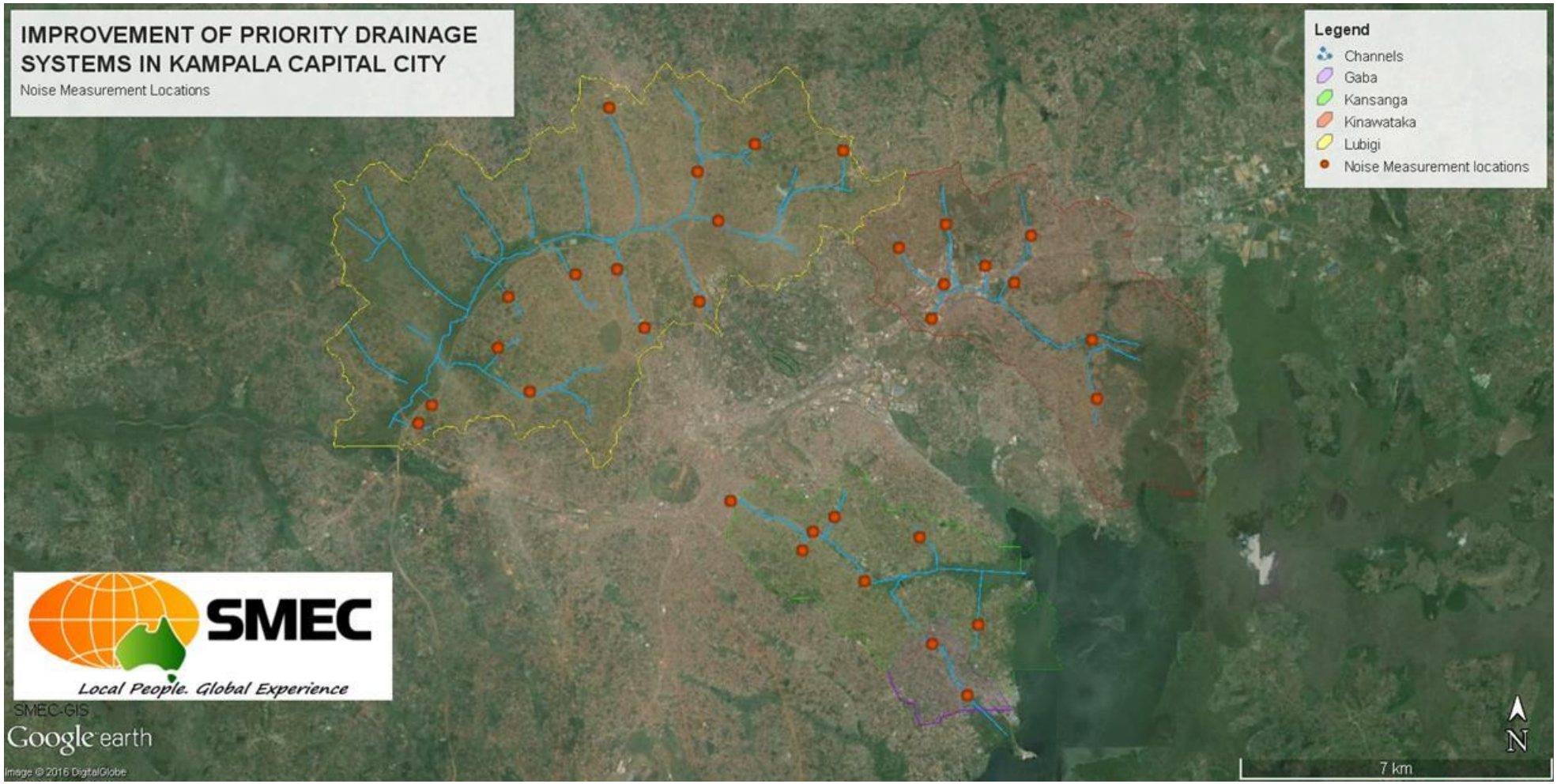


Figure 3-8: Noise measurement locations within the Project area

3.1.3 Ambient noise

Baseline noise measurements were undertaken at locations around the proposed project facility sites with potential receptors (Figure 3-8). Measurement of ambient noise levels was carried out using a precision integrating sound level meter (Figure 3-9), with an active range of 0-140 decibels (dB) and complying with IEC 651 and ANSI S4 standards. A Casella CEL-621C digital noise logger was set to record for a sample period of ten (10) minutes at each of the selected locations. The assessment procedure involved recording the LA_{MAX} and LA_{MIN} decibel levels. Measurement points were recorded using a GPS receiver and the noise sources together with the ambient environment at each location noted.

Figure 3-9: A CASELLA CEL-621C2/K1 Integrating 1/3 Octave Band Sound Level Meter (Class2) used for noise measurements

3.2 Establishment of Baseline Biological Environment

3.2.1 Vegetation

3.2.1.1 Background

Data from the National Biomass Study Unit of the National Forestry Authority, (Eilu at al 2009) indicated that in 2005, Uganda's wetlands cover had been reduced by an estimated 11%. This was largely attributed to the desire of both the rich and the poor to derive livelihoods from the wetlands, a situation exacerbated by the high annual population growth rate of 3.7 % (UBOS, 2006), industrial expansion and infrastructural developments especially in urban areas. In many urban areas particularly Kampala, wetlands are seen as the cheapest areas for industrial development and so many have been converted to industrial areas, agricultural expanses and the other taken over by semi-slum and slum residential areas (UNDP, 2009). As a result, wetlands suffer unregulated cultivation, waste disposal and business sites for local manufacturing artisans.

Wetlands have great capacity to perform several functions as ecosystem services and production of goods. Most of these functions are primarily of local interest, but others have regional, national and/or international importance. According to (Kagwa et al, 2009), ecosystem services include; water recharge, flood control, storm protection, nutrient retention micro-climate stabilisation, shore stabilization and water filtration. The goods include; fish, fuel wood, sand, gravel, clay, thatch, water, pasture and recreation while non-use values include; cultural value, aesthetic value, heritage values, bequest value and existence value.

These services are often taken for granted, but they can easily be lost as wetlands are altered or degraded in a watershed. To retain adequate flood control and water quality services, it is estimated that watersheds must retain 3-7% of its area in a wetland expanse (Mitsch & Gosselink 2000). A matter of concern is that replacing the lost ecological services of wetlands can be expensive, assuming they can be replaced at all. For example, a community that loses wetland services may need to invest more costly in drinking water treatment, storm and water management, and flood control infrastructure. Additionally residents face lower property values and reduced recreational amenities when wetland services are diminished (Wright, 2006).

The drainage of Kampala is mainly through eight (8) primary channels served by numerous secondary and tertiary systems. Human settlement and industrial development are extending from the many hills to the lower lying areas on the banks of the drainage channels which are part of wetlands and floodplains. The natural and manmade drainage channels along the floodplains and low-lying areas are regularly overtopped by floodwaters, causing damage to people's homes and industrial properties, seriously disrupting traffic flow and economic activity in the city and increasing water pollution. The frequency of flooding has increased due to increased runoff caused by land-use changes in the catchments and reduction of the buffer capacity of wetlands due to encroachment. All these result in loss of lives, destruction of livelihoods, and recurring costs to Kampala's socio-economy. Investment in upgrading drainage infrastructure is required to protect people and their property and also spur economic development.

With this Project, Kampala Capital City Authority (KCCA) intends to upgrade the priority drainage systems in Kampala in three catchments (Lubigi, Kinawataka and Kansanga/Gaba) to reduce the frequency of flooding due to increased urbanisation and development in order to counter the negative effects of floods on property, livelihoods and the economy (SMEC, 2015). It was therefore deemed necessary to carry out a biodiversity assessment along the channels and wetlands of interest. This section presents the observed status of flora and vegetation along the drainage channels and their catchments.

3.2.1.2 Objectives of the study

i. Document the vegetation along the drainage channels and in wetlands within Lubigi, Kinawataka and Kansanga/Gaba catchments in Kampala city, the types and levels of disturbance and environmental impacts arising from the disturbances.

ii. Assess the diversity, abundance and conservation status of plants within the wetlands and in pristine areas along the drainage channels.

iii. Draw conclusions and recommendations with regard to the current state and the likely impacts due to implementation of the drainage channels improvement activities.

3.2.1.3 Data collection

Vegetation and flora were assessed within an established 20 m x 20 m quadrant area at a suitable location along the channel. Existing vegetation types were traversed while simultaneously examining plant species, vegetation types and estimation of species percentage cover. Presence of signs of disturbances was done in both pristine and disturbed plant communities. Characterization of vegetation of the area was based on Langdale-Brown *et al.* (1964) classification. Habitat or ecosystem sensitivity was further assessed on account of presence of a taxon that is IUCN Red listed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU); endemic and near-endemic taxa; as well as rare taxa. Extended intention was to examine ecosystems with fragile watersheds, nesting grounds and riparian environments.

A time of 25 minutes was spent at each point carefully observing the turnover of vegetation communities and flora present, estimating species percentage covers, disturbance signs. Opportunistic recording for species not recorded at the regular survey locations was done in between survey locations.

The plants in each plot were given weights on a DAFOR scale on which D indicates dominant, A-abundant, F-frequent, O-occasional and R-rare. This was based on the species cover and turn over in the survey plots such that a plant with the biggest cover and turnover was considered dominant (D) and D carried a weight of 5. The order was followed with A=4, F=3, O=2 and one with the lowest cover and turnover was considered rare (R=1). The weights generated by a particular plant were summed up to get the total abundance of that plant in that particular catchment drainage.

3.2.1.4 Study areas

A) Lubigi Catchment System

The drainage catchment was surveyed by selecting working points along the primary channel which also acted as the major transect, along the secondary channels and drainage wetland (Figure B1). A total of 17 points were surveyed for Lubigi catchment. The study points traversed from Busega-Bulenga wetland (Figure B2) along Entebbe express highway through Northern Bypass, Masanafu-Bira, Namungona sewerage treatment area, Bwaise to Bukoto round about along the Northern bypass as shown in *Figure 3-10*.

B) Kansanga - Gaba Catchment Systems

The study was conducted within Kansanga and Gaba drainage catchments which includes their Primary and secondary channels, together with the wetlands into which the channels drain. The drainage catchment was surveyed by selecting working points along the primary channel which also acted as the major transect, along secondary channels (*Figure 3-11*). A total of 17 points were surveyed for Lubigi Kansanga and Gaba catchments.

C) Kinawataka Catchment System

The study was conducted in Kampala city along Kinawataka drainage catchment which includes her Primary and secondary channels, together with the wetland into which the channels drain. The catchment was surveyed by selecting working points along the primary channel which also acted as the major transect, along secondary channels and drainage wetland at Luzira (Figure 3-12). A total of 16 points were surveyed for Kinawataka drainage catchment. The study points for Kinawataka drainage catchment traversed from Kinawataka through Kasokoso to the wetland at Kito village.

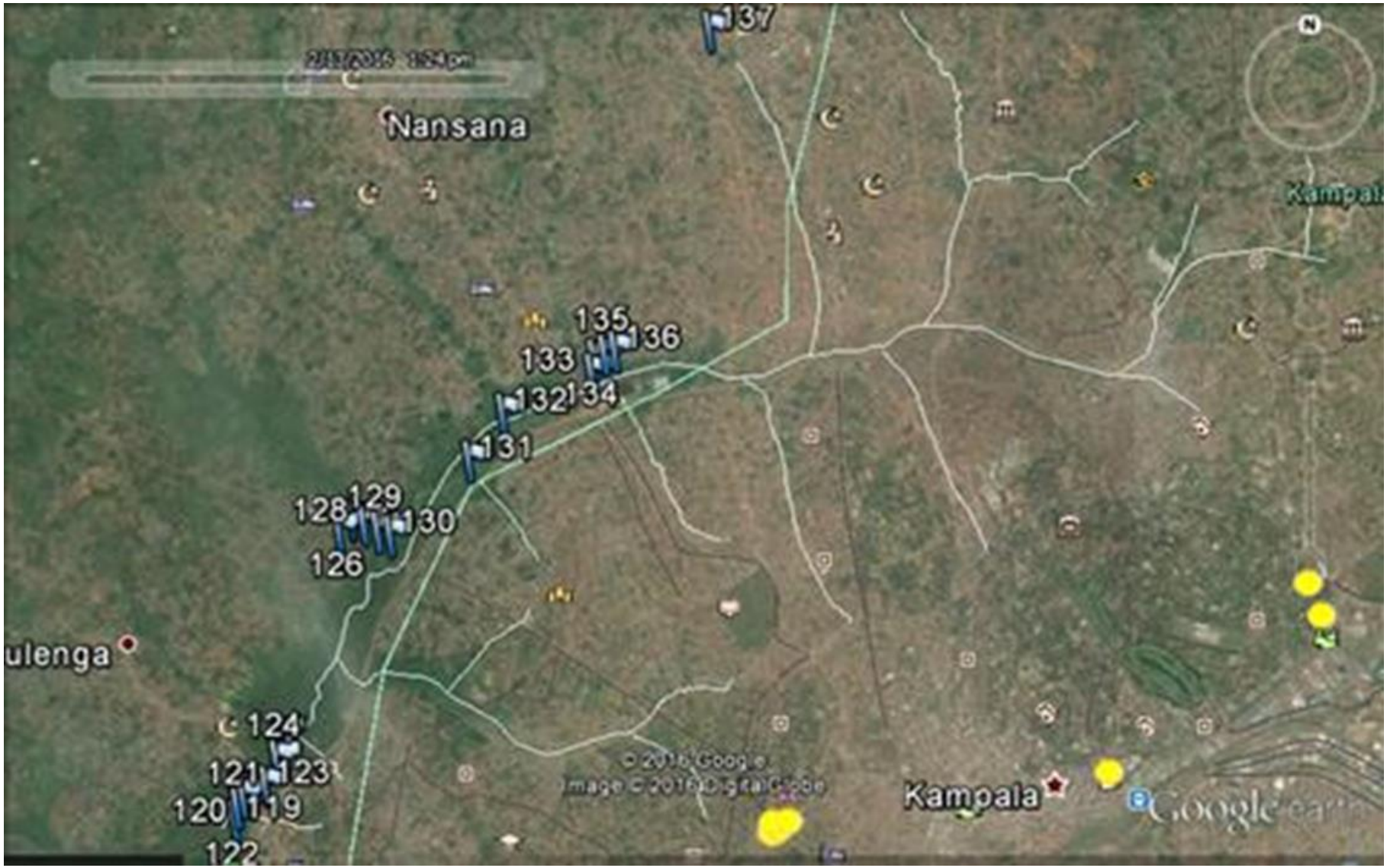


Figure 3-10: Survey points along the Lubigi primary channel

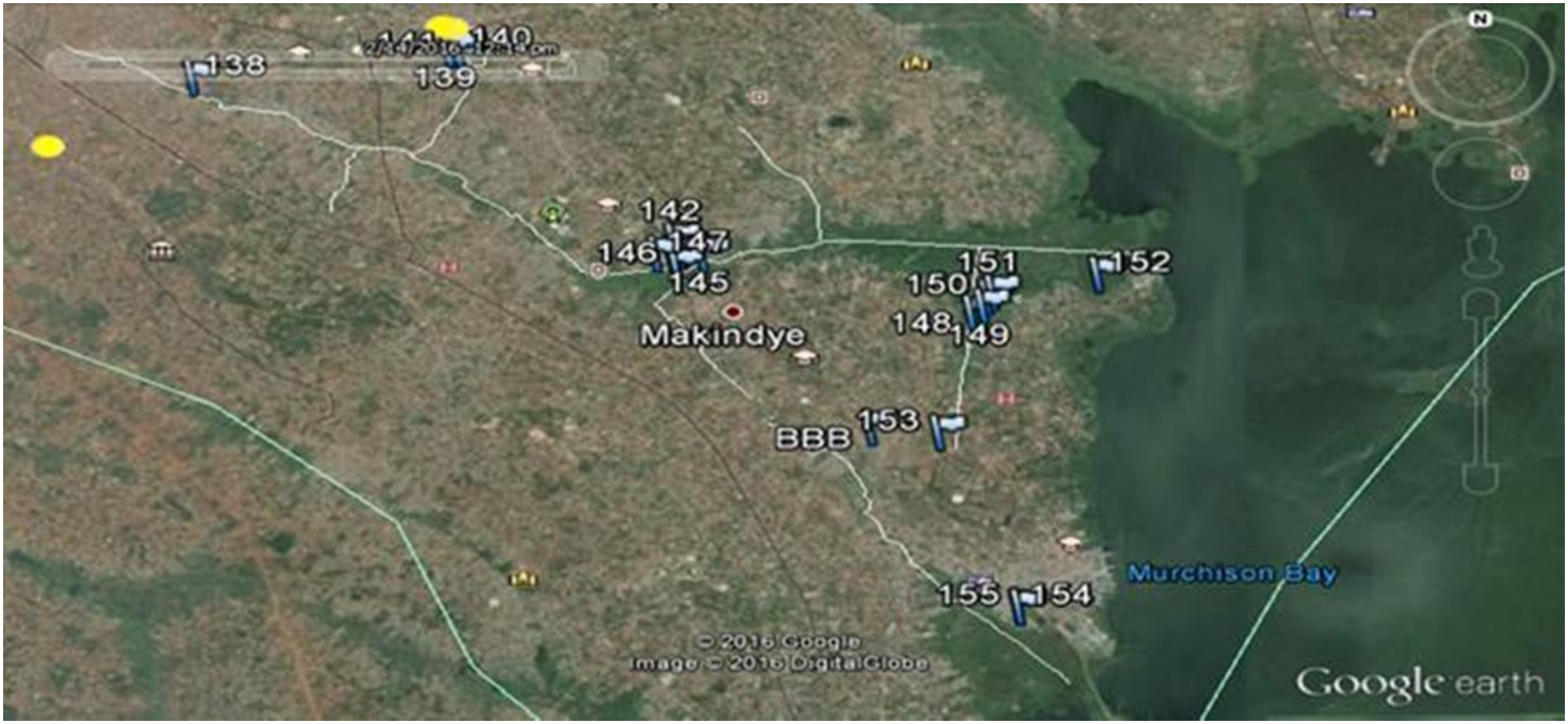


Figure 3-11: Survey points within Kansanga-Gaba catchment systems

Figure 3-12: Study points at Kinawataka drainage catchment

3.2.2 Fauna – Invertebrates

3.2.2.1 Introduction

Vast numbers of insect species exist on Earth. They are the predominant components of animal species richness in most terrestrial and freshwater environments, and by far outnumber many more familiar or popular animal groups, such as vertebrates (New, 2009). Butterflies are insects that belong to the order *Lepidoptera* of taxonomic classification and they offer advantages in biodiversity studies because they are highly diverse, relatively easy to identify, and amenable to quantitative sampling. They are found in many habitats and niches, making ecological comparisons possible, and they can indicate areas of endemism (Pogue 2009). On the other hand Dragonflies belong to the order *Odonata* together with the damselflies (Morse 2009). They are widely distributed and abundant in almost all permanent fresh and brackish water. They are particularly abundant in warmer waters such as those in lowlands of tropical and subtropical regions. A few species are semi-aquatic in bog moss, damp leaves, and seepages, and a few tropical species inhabit water in bromeliads or tree holes (Morse 2009). Uganda has been reported to harbour 6.8% of butterflies and 4.6% of dragonflies which are globally recognized (NEMA, 2009), and there are between 18,000 and 20,000 species of butterflies worldwide (Speight et al, 2008).

3.2.2.2 Objectives of the study

i. To determine the species diversity of butterflies and dragon flies within Lubigi, Kinawataka and Kansanga/Gaba catchments

ii. To determine the conservation status of butterflies and dragon flies.

iii. Draw conclusions and recommendations with regard to the likely impacts due to implementation of the drainage channels improvement activities.

3.2.2.3 The study area

The study areas where sampling was done were Lubigi, Kansanga – Gaba, and Kinawataka drainage catchment areas, within Kampala district, Uganda (*Figure 3-13*).

Figure 3-13: Fauna (Invertebrates) sampling areas within the drainage systems

3.2.2.4 Sampling Design

Sampling was done during the day between 9:00 am to 4:00 pm in each of the study sites, for three days. Data for Butterflies and dragon flies was collected using a sweep net. Individuals of different species of butterflies and dragon flies were collected and preserved for further identification. Through visual encounter surveys (VES), other species of dragon flies and butterflies were seen and identified, and recorded as they were flying through their habitats.

3.2.3 Fauna – Terrestrial Vertebrates

3.2.3.1 Introduction

The drainage of Kampala is mainly through eight (08) primary channels served by numerous secondary and tertiary systems. Human settlement and industrial developments are extending from the many hills to the lower lying areas on the banks of the drainage channels which are part of wetlands and floodplains. The natural and manmade drainage channels along the floodplains and low-lying areas are regularly overtopped by floodwaters, causing damage to people's homes and industrial properties, seriously disrupting traffic flow and economic activity in the city and increasing water pollution. All the drainage channels draining Kampala empty their contents into swamp systems which eventually connect to lakes and rivers, thus having an impact on the water quality within the country's hydrology.

3.2.3.2 Uganda's wetlands and their ecological functions

Wetlands in Uganda cover about 13% or 30,000 km^2 of the country and include areas of seasonally flooded grassland, swamp forest, permanently flooded papyrus and grass swamp and upland bog (Namakambo, 2000).

Wetlands provide a variety of goods, services and attributes. Some of these are locally relevant; others have a regional, national or international importance. All together, the goods, services and attributes constitute a considerable ecological, social and economic value, which may be lost when wetlands are converted or altered (Namakambo 2000). Wetlands are definitely not wastelands but wealth lands contributing to the gross national product through both visible and more intangible benefits.

Ecological functions are those that wetlands perform without immediate human intervention. Typical examples are maintenance of the water table, flood control, and the provision of habitats for plants and animals.

The frequency of flooding in Kampala has in the past increased due to increased runoff caused by land-use changes in the catchments and reduction of the buffer capacity of wetlands due to encroachment; all this results in loss of lives, destruction of livelihoods and recurring costs to Kampala's socio-economy. Investment in upgrading drainage infrastructure is required to protect people and their property and also spur economic development.

3.2.3.3 Ecology of Lake Victoria

Lake Victoria is the second largest Freshwater Lake in the world, and has the world's largest fresh water fishery (Masifwa *et al,* 2001), which supports an economically and socially important export fishery for the riparian countries. The lake basin supports over 30 million people and is arguably known as the source of the Nile River. The lake ecosystem is amphibiously diverse because it provides the right environment suitable for amphibian and reptilian life. The threats facing the lake include eutrophication, over exploitation of resources including riparian vegetation, climate change and other anthropogenic influences.

3.2.3.4 Ecology of Amphibians and Reptiles

Ecologically, amphibians are important; they are mostly predators, acting as primary and secondary carnivores. Their prey consists mostly of insects, some of which are pests to crops or disease vectors. They are also inter-linked in food chains, often acting as food for other vertebrates, such as Fellids, birds, snakes and medium sized Canids. Amphibians are known to be easily recognizable taxa in any given habitat; and populations are sometimes specialized within a narrow habitat. This makes it easy and practical to monitor changes in composition over time, given different conditions (Heyer *et al*, 1994). Impacts on their habitat are reflected in changes in numbers and species diversity in a short time. These are some of the factors that have made amphibians to be recognized as good indicators of habitat change.

Reptiles are often grouped together with amphibians and termed as "Hepertiles". They are also important for habitat monitoring because as amphibians, most of them have specific habitat requirements for successful survival. Reptiles are dependent on their surrounding environment to control their metabolic rate and as such a slight modification in the environment may compromise their metabolism and consequently death. They are important predators within the food webs of their habitats, hence keeping animals that humans regard as pests under control.

3.2.3.5 Rationale for studying amphibian and reptiles

Given their sensitivity to habitat alteration and pollution, amphibians may serve as indicators of overall environmental health. Amphibians are bio-indictors of an altered ecosystem and are very sensitive environmental monitors. Significant declines could indicate deterioration in the quality of the environment. This role as indicators can be based on the assumption that the adverse effects of environmental degradation will be reflected in reduction of hepertilian diversity (Magurran, 1988). Amphibians unlike people breathe at least partly through their skin making them much sensitive to environmental disturbance (IUCN/SSC, 2003).

The eggs and embryos of frogs in wetlands are very sensitive indicators of any adverse changes in the water chemistry (Channing, 2001).

3.2.3.6 Methods

Field data was obtained by conducting a survey of amphibians and reptiles along chosen survey points along the drainage channels in catchments of Lubigi (Figure 3-14), Kansanga-Gaba (Figure 3-15) and Kinawataka (Figure 3-16). Various methods i.e. Visual Encounter Surveys, opportunistic surveys and local consultations were used for amphibians. The species were counted and recorded after which their conservation status was assessed using the IUCN Red Listing (IUCN 2013).

i) **Visual Encounter Surveys (VES)**

This method involved walking through the study areas or habitats for a prescribed time period systematically searching for amphibians by turning logs or stones, inspecting retreats, watching out for surface-active species and listening out for frog calls. Visual encounter survey method is commonly used to determine the species richness of an area, to compile a species list and to estimate relative abundances of species within an assemblage.

ii) **Opportunistic Encounters**

This method involves recording any amphibian or reptilian species encountered anywhere and at any time within the study area, or brought in / reported by local people. Opportunistic searches were used to maximize the number of species encountered in the study area.

iii) **Local Consultations**

Local people are a valuable source of information since they are constantly in touch with their environment; they encounter amphibians and reptiles of different kinds as they carry out their daily

activities. We talked to some local people who informed us about the availability of some species of reptiles and amphibians.

Some of the records were later confirmed by encountering some of them in the field. The reptiles and amphibians were identified using standard reference books available namely; Schiotz (1972) and Drewes (2006).

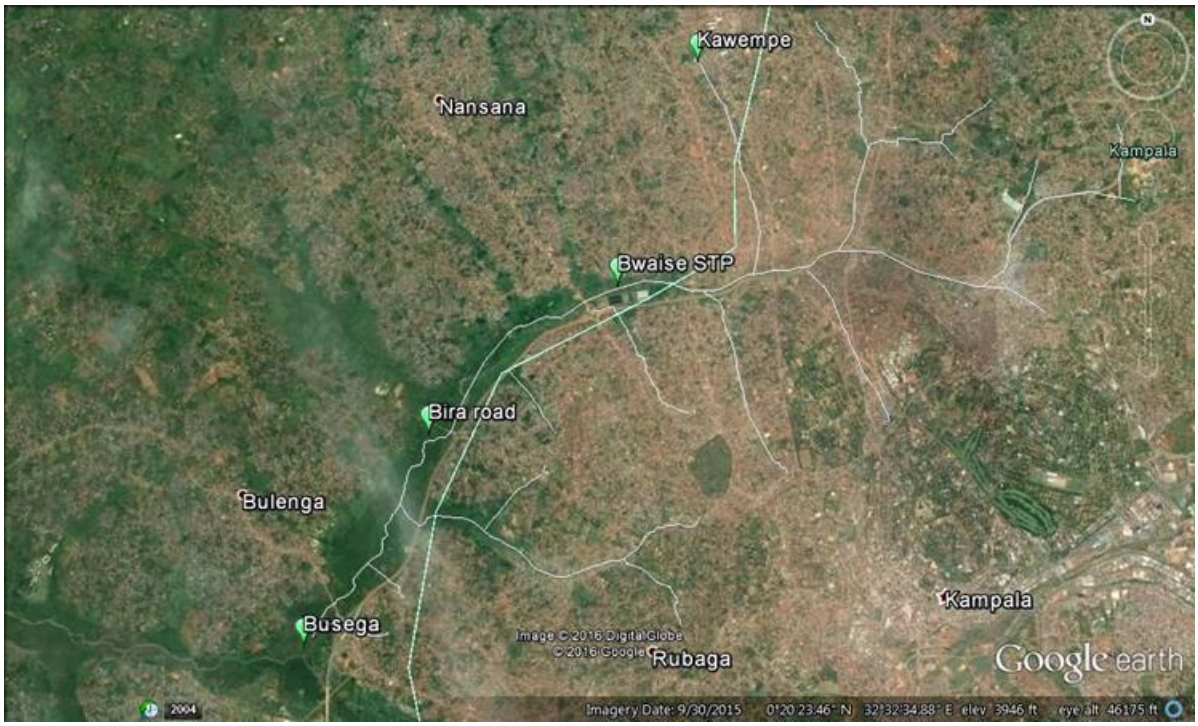


Figure 3-14: Fauna (terrestrial vertebrates) sampling areas within Lubigi drainage system

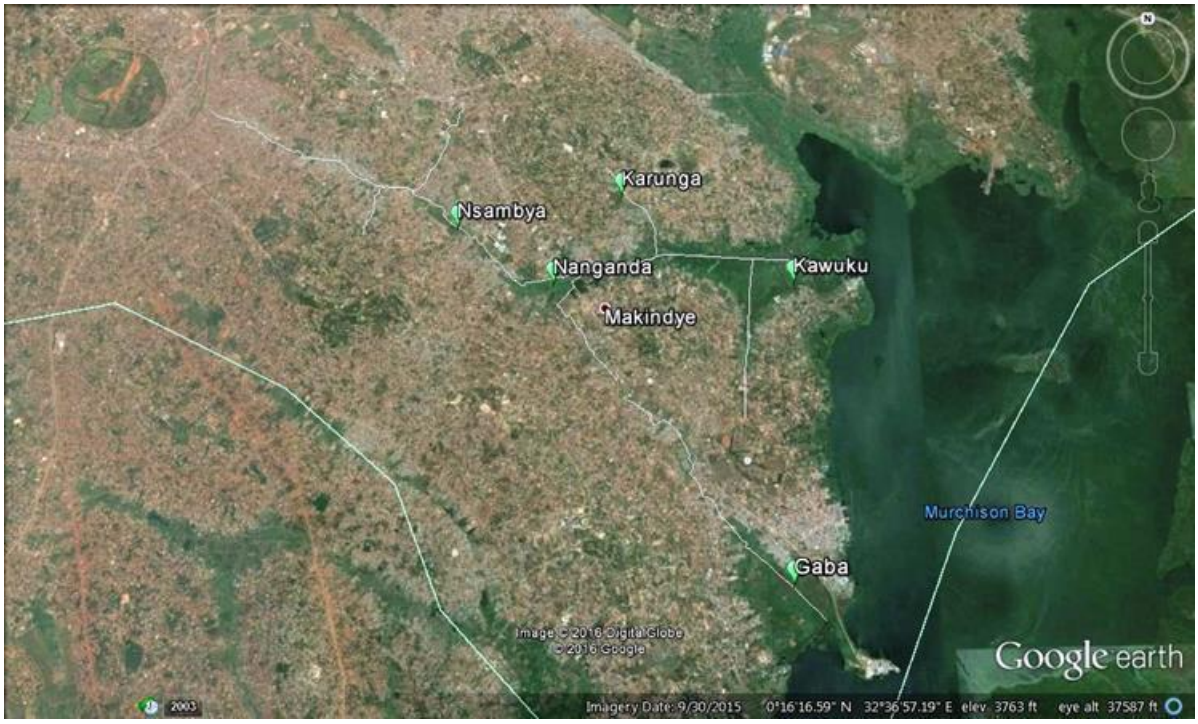


Figure 3-15: Fauna (terrestrial vertebrates) sampling areas within Kansanga-Gaba drainage system

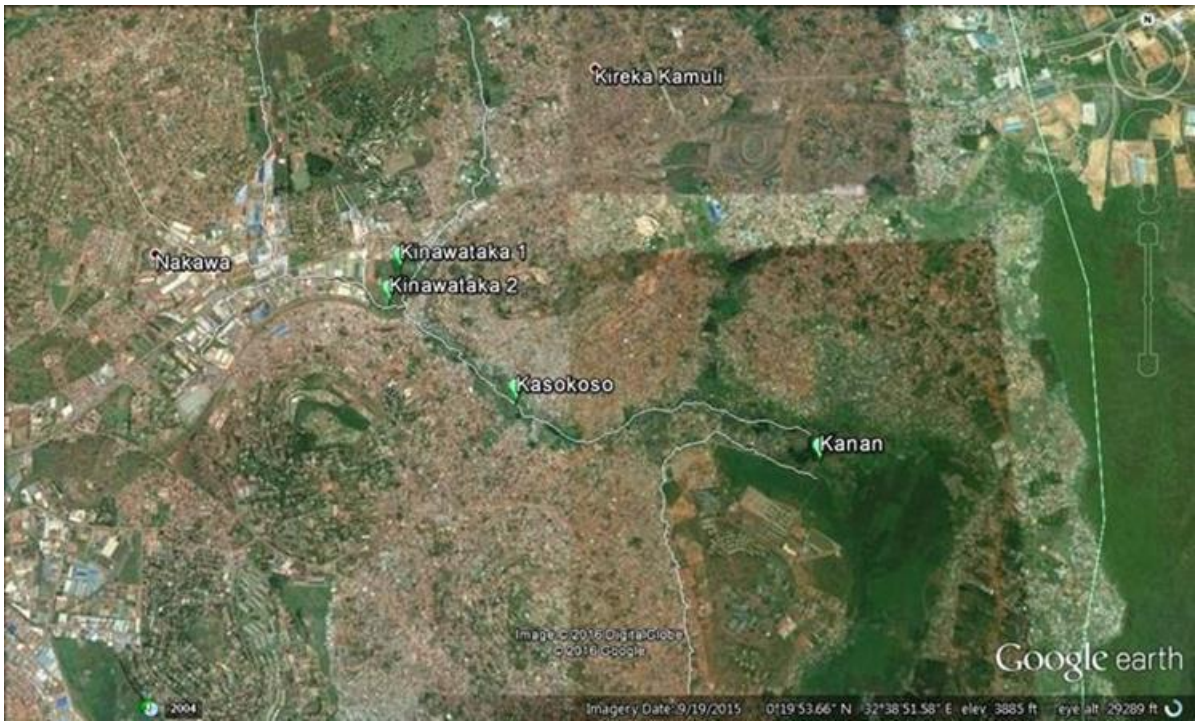


Figure 3-16: Fauna (terrestrial vertebrates) sampling areas within Kinawataka drainage system

3.2.4 Fauna - Birds

3.2.4.1 Introduction

Uganda has 1007 bird species, of which 7 are Endangered, 11 Vulnerable and 26 Near-threatened. 190 species are listed in the East Africa Regional Red List (Bennun and Njoroge 1996). The categories of birds according to their habitat (Table 3-1) include forest specialists (FF), forest generalists or forest edge species (F), forest visitors (f), species restricted to wetlands/open waters (W), water bird non-specialist, often found near water (w) and grassland species (G) (Caswell, *et al* 2005, Bennun *et al* 1996).

Uganda has 134 bird species that are Palaearctic migrants (species that breed in Europe and Asia during summer and migrate to Africa during winter season). It is also a range state for 56 species that are Afro-tropical migrants (birds that migrate within the African continent) (Caswel, *et al* 2005).

Table 3-1: Classification of birds according to their habitat requirements

Category	Description	Abbreviation
Forest birds	Forest specialists, cannot survive outside the primary forest	FF
	Forest generalists or forest edge species. They can live in the forest and at the forest edge or a degraded forest	F
	Don't live in the forest, they come to the forest as 'visitors'	f
Water birds	Species restricted to wetlands/open waters. They cannot survive outside an aquatic environment	W
	Water bird non-specialist-often found near water. They can as well survive where there is no water.	w
Grassland birds	Live in grassland habitats and sometimes in cultivations	G
Wide spread	These are generally found in all habitats but tend to avoid forests	Ws

3.2.4.2 Conservation value of birds

Given the significance of birds for conservation planning and environmental assessments, there is a need for a better ecological understanding of the role of avian community structure in conservation decision-making. Thus, they are widely used in conservation and population trends in farmland, and are one of the 15 'Quality of Life' indicators. In particular, small land birds have often been proposed as potential indicators for the presence of other unrelated taxa or as environmental change indicators to be integrated into broader monitoring schemes. Furthermore, they are frequently included in evaluation studies for overall biodiversity conservation (Gregory et al. 2004).

3.2.4.3 Birds as biodiversity indicators

Birds are good indicators of general biodiversity i.e. areas very rich in birds species have been found to also be rich in other biodiversity. Birds have been found useful as bio-indicators because they are:

- Wide spread - they occur in all habitats (forest, grassland, water, cultivation)
- Relatively large – conspicuous, easily surveyed with simple methods like observations, use of calls to record presence or absence
- Mostly active during the day (compared to many mammals and amphibians)
- Specialized in their habitats in some cases e.g. forest or water bird specialist. The disappearance of such specialist species in an ecosystem can be used to assess the health of that particular ecosystem or the extent of degradation.

Changes in the biology/ecology of an area can be the most tangible outcomes of many developments and unfortunately, it is not uncommon to see severe impacts on the biology. However, with rigorous scoping and impact assessing, it is possible to reduce or eliminate the impacts through mitigating measures.

3.2.4.4 Methods

Field data was obtained by conducting a survey of birds along chosen survey points along the drainage channels. Transect count sampling was the study method employed for birds. The species were counted and recorded after which their conservation status was assessed using the IUCN Red Listing (IUCN 2013).

3.2.4.5 Transect count sampling

In each of the survey locations, a transect count was done where all the species seen or heard were recorded. Transect count was employed because it is suited for:

- extensive, open, and uniform habitats
- mobile, large or conspicuous species
- species that can easily be flushed out
- populations that occur at lower densities
- areas that are more species poor

Birds were identified using one standard reference book, Stevenson and Fanshawe (2002).

A) Lubigi Catchment System

A total of 4 sites were surveyed along this channel as shown in Figure 3-17 and Table 3-2.

Figure 3-17: Fauna (birds) sampling areas within Lubigi drainage system

Table 3-2: Survey locations with associated geo-references and site descriptions in Lubigi

General Survey points	Eastings	Northings	Site description
Busega-Lubigi	445492	34244	Papyrus swamp-Gardens and bush
Bira road	447037	36953	Papyrus swamp-Gardens and bush
Bwaise	449343	38478	Papyrus swamp-Eucalyptus plantation-gardens & stream

B) Kansanga-Gaba Catchment Systems

A total of 5 sites were surveyed along this channel Figure 3-18 and Table 3-3.

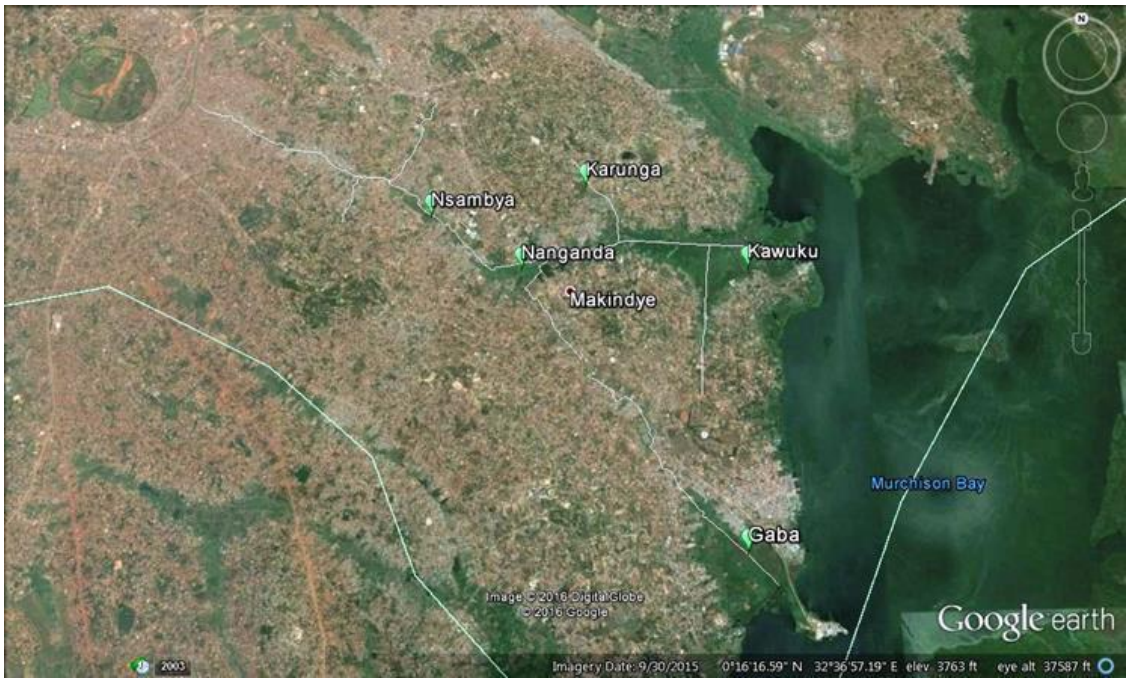


Figure 3-18: Fauna (birds) sampling areas within Kansanga-Gaba drainage system

Table 3-3: Survey locations with associated geo-references and site descriptions in Kansanga-Gaba

General Survey points	Eastings	Northings	Site description
Nsambya	453960	32323	Marsh-Gardens and stream
Karunga	455642	32551	Scrub-Bush stream
Nanganda	456924	30796	Eucalyptus, scrub, Papyrus swamp and stream
Kawuku	459622	30708	Papyrus swamp and scrub
Gaba	459149	27807	Papyrus swamp, gardens and stream

C) Kinawataka Catchment System

A total of 5 sites were surveyed along this channel Figure 3-19 and Table 3-4.

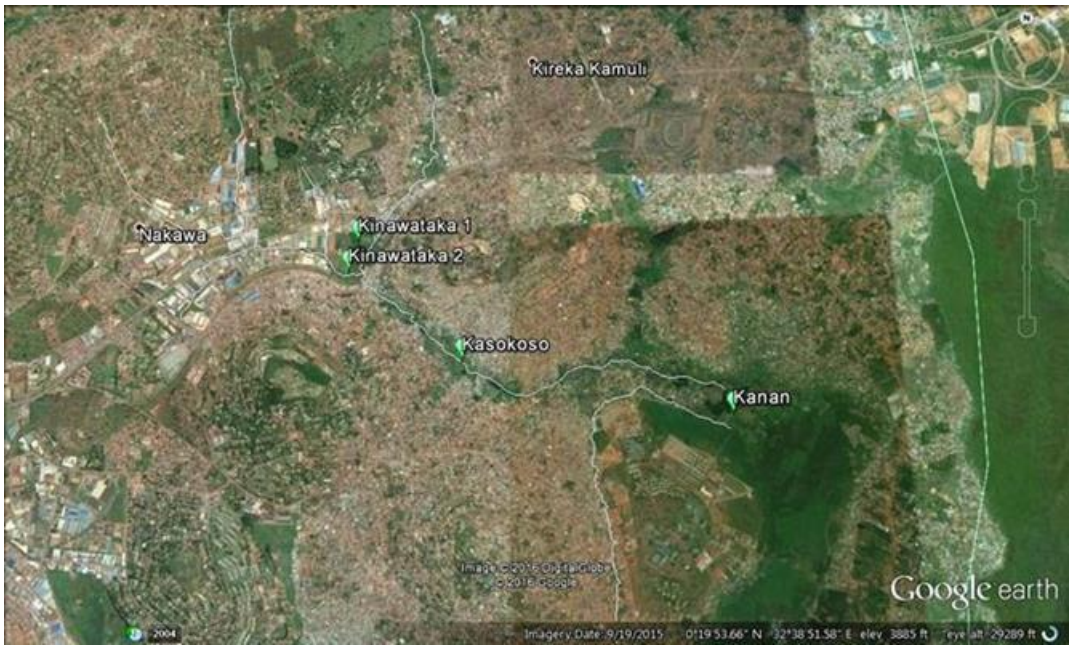


Figure 3-19: Fauna (birds) sampling areas within Kinawataka drainage system

Table 3-4: Survey locations with associated geo-references and site descriptions in Kinawataka

General Survey points	Eastings	Northings	Site description
Kinawataka 1	459188	37166	Sugar cane plantation, Papyrus swamp & stream
Kinawataka 2	459261	37305	Regenerating grass next to papyrus swamp
Kasokoso	460449	36162	Gardens-Bush-eucalyptus plantation & Stream
Kanan village	462436	35880	Papyrus swamp-Eucalyptus plantation and Gardens & stream

3.3 Stakeholder Engagement and Public Consultations

As part of the ESIA process, stakeholders were consulted prior to submission of the Environmental Impact Statement to NEMA. Various stakeholders were identified at the scoping stage of the ESIA study, in consideration of their involvement in the Project. Consultations were held with different groups, depending on their interest in the Project. The various groups consulted included:

i) National level meetings: Meetings with key national level institutions, especially the lead agencies for the project of interest. These included Directorate of Water Resources Management (DWRM) and Wetlands Management Department (WMD) in the Ministry of Water and Environment (MWE); Office of the Chief Government Valuer (CGV) in Ministry of Lands, Housing and Urban Development (MLHUD); Occupational Safety and Health (OSH) in the Ministry of Gender, Labour and Social Development (MGLSD).

ii) Division and location-level meetings: Meetings were held with relevant local authority officials in order to inform them about the project in their areas of jurisdiction and have their input into the environmental and social impacts of the project, and propose workable mitigation measures. These were held first with the Office of the Town Clerk, then with the area Councillors, and chairpersons in the Project affected zones/villages.

iii) Local community members: Residents and property owners in the Project area were consulted with, to provide them with an understanding of the Project, potential impacts and proposed mitigation measures. Since one of the impacts is land take, the RAP Process was explained in detail during these meetings.

iv) Interviews and surveys: These were carried out as part of the information and data gathering process for the socio-economic assessment of the people in the Project area.

The views/concerns and opinions of women, youth and other groups that may be deemed as vulnerable were taken into account during specific meetings, as required. All such interested and affected parties were allowed the opportunity to make comments and express their views on the proposed Project's impacts and mitigation measures being proposed to address these impacts, in the appropriate form and process.

Attendance registers were completed by participants of each consultation meeting and notes of the consultation meetings compiled. These are included in Volume 2; Appendices report.

Table 3-5 provides a list of consultation meetings that were conducted during the ESIA, since August 2015. A number of meetings were held in the early stages of the Project (Scoping phase) in order to forge a way forward since the Project will affect people in various locations across Kampala district, and neighbouring parts of Wakiso district.

Table 3-5: Meetings held with various stakeholders

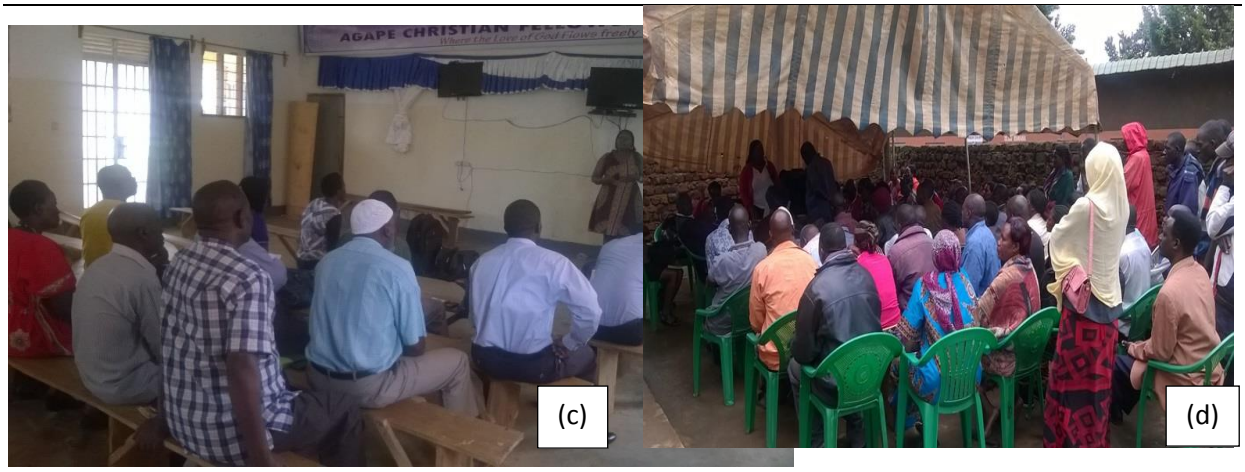
Date	Stakeholder consulted	Reason for consultation
Institutions		
29th January 2016	Office of the Chief Government Valuer	Meeting to discuss the procedure for surveying and valuation for the
1st December 2015	Ministry of Water and Environment – Wetlands Management Department (WMD)	Meeting to provide an overview of the Project and discuss the wetlands to be affected by the Project, compensation options for people settled in wetlands
8th September 2015	Ministry of Water and Environment – Directorate of Water Resources Management (DWRM)	Wetlands to be affected; Channels eventually drain into receiving water bodies
24th November 2015	Buganda Land Board	Discussion about handling compensation on Kabaka's land affected by the Project
14th August 2015	Wakiso District Local Government	Contributing catchment; project impacts could extend to areas within their

Date	Stakeholder consulted	Reason for consultation
		jurisdiction
14th August 2015	National Water and Sewerage Corporation	NWSC Infrastructure to be affected by project -crosses or along drainage channels
Office of the Division Town Clerk		
15th February 2016	Kira Municipal Council, Wakiso District	Meeting with office of the Town Clerk to provide an overview of the project with the intent of establishing follow up meetings with council representatives
23rd October 2015	Makindye Division	
12th August 2015	Kawempe Division	
7th August 2015	Central Division	
15th October 2015	Nakawa Division	Meeting with Town Clerk of Nakawa District Council to discuss the aggravation / violence shown against the AES surveyors on Secondary Channel #01, Kinawataka
Division Councils		
20th October 2015	Nakawa Division Council	Meeting with councillors within the division to provide an overview of the project with the intent of establishing follow up meetings with local area chairpersons in the Project affected villages
14th October 2015	Kawempe Division Council	
	Makindye Division	
	Lubaga Division	
Local Chairpersons		
4th December 2015	Kansanga A & B Parishes, Makindye Division	Meeting with councillors local area leaders (LC 1) within the Project areas to provide an overview of the project with the intent of establishing follow up sensitization meetings with affected communities
3rd December 2015	Nsambya Central, Nsambya West, Katwe II Parishes, Makindye Division	
2nd December 2015	Makindye I, Lukuli & Kibuye I Parishes, Makindye Division Gaba A & Gaba B Parishes, Makindye Division	
26th November 2015	Lubya Parish, Lubaga Division	
25th November 2015	Kasubi and Nakulabye Parishes, Lubaga Division	
24th November 2015	Lungujja and Busega Parishes, Lubaga Division	
23rd November 2015	Lugoba Parish, Lubaga Division	
29th October 2015	LC 1 Chairpersons (Channels 10 - Lubigi)	
28th October 2015	LC 1 Chairpersons (Channels	

Date	Stakeholder consulted	Reason for consultation
	09 - Lubigi)	
27th October 2015	LC 1 Chairpersons (Channels 06 & 08 – Lubigi)	
21st October 2015	LC 1 Chairpersons (Channel 07 – Lubigi)	
Community Members		
16th February 2016	Masanafu Kinoonya, Namungoona I, Namungoona II, Bukulugi villages; Lubya Parish, Lubaga Division	Secondary 04, Lubigi Primary
10th February 2016	Kigwanya village, Busega Parish, Lubaga Division	Secondary 01, Lubigi Primary
9th February 2016	Kawaala I, Kasubi I, Kasubi II villages; Kasubi Parish, Lubaga Division Zone VII, Zone IX; Nakulabye Parish, Lubaga Division	Secondary 06, Lubigi Primary
8th February 2016	Kabaale village, Busega Parish, Lubaga Division	Secondary 02, Lubigi Primary
5th February 2016	Zone A, Zone B, Zone C; Makerere II Parish, Kawempe Division	Secondary 06, Lubigi Primary
22nd January 2016	Tebandeke zone, Nabutiti, Kansanga A Parish, Makindye Division	Secondary 02, Kansanga Primary Channel re-alignment
23rd November 2015	Lugoba and Corner zones; Kazo Angola Parish, Kawempe Division	Secondary 7, Lubigi Primary
19th November 2015	Lufula zone; Bwaise II Parish, Kawempe Division Kazo Angola Central zone; Kazo Angola Parish, Kawempe Division	Secondary 7, Lubigi Primary
17th November 2015	Nabukalu, Nakamiro, and Jambula zones; Bwaise II Parish, Kawempe Division	Secondary 7, Lubigi Primary
16th November 2015	Bokasa and Bugalani zones, Bwaise III Parish, Kawempe Division	Secondary 7, Lubigi Primary

Figure 3-20 shows pictures of some of the meetings held within the Project area.

Community sensitization in (a) Jambula and (b) Kazo Angola zones along Secondary 7, Lubigi catchment



Meeting with local area leaders in Makerere I, II, and III Parishes (c) Meeting with community members in Kisalosalo zone along Secondary 10, Lubigi catchment (d)

Community sensitization in (e) Nkere, Lusaka, Nabisalu and Nsambya West zones, along Kansanga Primary channel (f) Masanafu Kinoonya, Namungoona I and Namungoona zones in Lubaga Division

Meeting with the Town Clerk and Technical officials of Kawempe Division.

Meeting with the Councillors of Makindye division.

Figure 3-20: Meetings held with various stakeholders within the Project area

3.4 Impact identification and analysis

Identification of impacts involved use of simple matrices consisting of two dimensional check lists.

Potentially significant impacts were detected based on professional experience of the ESIA specialists. Baseline measurements and surveys were undertaken in order to identify any potential receptors that could be affected negatively by the project, and hence used in determination of any impact severity.

In regard to features of significant importance in the area, elaborate discussions with key stakeholders were conducted. The findings from stakeholder consultations were also used in the identification of impacts as well as determination of the significance of impacts.

Three stages were utilised to establish significance of impacts as follows:

a) *Impact severity*: how severe is the impact (negligible, low, medium, and high). The severity of an impact is a function of a range of considerations including:

- impact magnitude;
- impact extent in time, space;
- impact duration;
- reversibility of impacts; and
- Receptor sensitivity or vulnerability of environment affected.

b) *Likelihood of occurrence*: how likely is the impact to occur (none, low, medium and high); and

c) *Identification of the impact significance*, which is the product of a combination of the above two variables.

The process for combining the significance of the impact with the likelihood of the impact is shown as a matrix below.

Matrix 1: Derivation of impact significance

Impact Severity	**Impact Likelihood**			
	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

Mitigation measures were proposed based on findings of the field surveys/analyses and stakeholder consultations. Recommendations were made in accordance with Ugandan laws and regulations, the World Bank Environmental Health Safety Sector Guidelines, sound technological measures, and standard industry best practice. Mitigation measures that require to be integrated in the early planning stages of the project were proposed following preliminary impacts identification.

Environmental and Social Management Plan (ESMP)

After identification of mitigation measures, the SMEC team prepared an ESMP with procedures, plans and costs, as well responsible parties for implementing the recommended measures. The ESMP has been included in the ESIA Report and includes:

- The identified social and environmental impacts;
- Recommendations of feasible and cost effective measures to prevent or reduce significant negative impacts to acceptable levels;
- Estimated magnitude of impacts and costs of mitigation measures; consideration for compensation to affected parties for the impacts that cannot be mitigated;
- Set of “best practices” measures to be followed in order to avoid some of the impacts during construction and operation phases of the project;
- Identification of the institutional needs to implement environmental and social recommendations including a review of the capacities of the relevant institutions; and
- Description of the detailed arrangements required for monitoring the implementation of the mitigation measures and the impacts of the project during the construction and operation; proposed work programs, budget estimations, schedules, responsibilities for implementation and other necessary support services to implement the ESMP.

4 POLICY, LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

This section discusses national policies, laws and regulations and KCCA byelaws relevant for successful implementation of the proposed project in an environmentally sustainable manner. The linkage of each of the cited policies, laws and regulations with the proposed project has been provided. A list of permits or licences that will have to be obtained before project implementation is given but caution should be taken by the developer to ensure that any other permits not listed are obtained. An institutional framework showing agencies likely to be associated with the project and their roles has been elaborated in Section 4.4.

The project development partner (World Bank) has a set of environmental and social safeguards to guide the implementation of projects it supports and these have been discussed in Section 4.6.

4.1 National Policy Framework

4.1.1 The National Environment Management Policy, 1994

The overall goal of this policy is the promotion of sustainable economic and social development, mindful of the needs for future generations. ESIA is one of the vital tools considered necessary to ensure environmental quality and resource productivity on long-term basis. The Policy requires that projects or policies likely to have significant adverse ecological or social impacts undertake an ESIA before their implementation. This is also reaffirmed in the National Environment Act, Cap 153 which makes ESIA a legal requirement for specific categories of projects as listed in the Third Schedule.

Relevance to this Project: In line with this policy, this ESIA study is being conducted to take into consideration any social and environmental impacts of the Kampala Drainage Improvement Project.

4.1.2 Uganda National Land Policy, 2013

The overall goal of the Policy is 'to ensure an efficient, equitable and optimal utilization and management of Uganda's land resources for poverty reduction, wealth creation and overall socio-economic development'. One of the guiding principles of the Land Policy is 'effective regulation of land use and land development. One of the objectives of this policy is to ensure planned, environmentally- friendly, affordable and orderly development of human settlements for both rural and urban areas, including infrastructure development.

Relevance to this Project: The land required for this project implementation will be obtained and used in line with the principles of this policy.

4.1.3 Uganda National Land Use Policy, 2006

The overall goal for the national land use policy is "To achieve sustainable and equitable socio-economic development through optimal land management and utilization in Uganda". Some of the specific goals for the policy include:

i. To promote land use activities that ensure sustainable utilization and management of environmental, natural and cultural resources for national socio-economic development;
ii. To ensure planned, environmentally friendly, affordable and well-distributed human settlements for both rural and urban areas.

Wetlands are one of the important land uses in Uganda, and yet are very susceptible to destruction through cultivation and other developments on marginal lands and fragile ecosystems. This Policy was developed to make provision for the sustainable utilization of wetland resources, together with the National Environment Act and National Wetlands Management Policy.

Relevance to this Project: The land required for this project implementation will be obtained and used in line with the principles of this policy, with particular consideration for wetlands management since the Project area greatly interacts with wetlands in Lubigi, Kansanga-Gaba and Kinawataka.

Policy statement 23 'To integrate the provision of basic infrastructure and services in human settlements' is aimed at solving the issue of inadequate integration of infrastructure such as safe water, drainage and sanitation waste disposal services in human settlements. This Project is aimed at fulfilling this Policy statement.

4.1.4 National Policy for the Conservation and Management of Wetland Resources, 1995

The overall aim is to promote the conservation of Uganda's wetlands in order to sustain their ecological and socio-economic functions for the present and future wellbeing of the people. One of the goals of the policy is to 'Maintain the functions and values derived from wetland resources throughout Uganda'. Another goal is to 'Maintain a biological diversity in wetlands either in the natural community of plants and animals or in the multiplicity of agricultural activity.' One of the specific Policy strategies is that 'There will be no drainage of wetlands unless more important environmental management requirements supersede'.

Relevance to this Project: This Project's designs will adhere to the principles of sustainability such that areas within wetlands are left intact, as much as possible.

4.1.5 National Gender Policy, 1997

The goal of this policy is to mainstream gender issues in the national development process in order to improve the social, legal/civic, political, economic and cultural conditions of the people of Uganda, particularly women.

Relevance to this Project: This Project will require labour during construction, and operation and maintenance phases. This Policy advocates for equitable inclusion of women in the workforce and also requires provision of a work environment equally conducive to women as it is for men.

1.1.1 National Water Policy, 1997

The National Water Policy promotes a new integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda. The goal of this policy is to provide guidance on development and management of 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, with full participation of all stakeholders and mindful of the needs of future generations. The policy aims to:

- Promote rational use of water;
- Control pollution and promote safe storage, treatment and disposal of waste, which could pollute water and impact public health; and
- Promotion of awareness of water management and development issues and capacity building.

Relevance to this Project: Management of storm water drainage has an impact on downstream water quality. This project will be implemented to adequately convey storm water through the respective catchments to improve on storm water management in the City, and reduce flooding problems which can contribute to water pollution.

1.1.2 Occupational Health and Safety Policy

This policy seeks to:

- Provide and maintain a healthy working environment;
- Institutionalize OHS in the power-sector policies, programs and plans; and

- Contribute towards safeguarding the physical environment.

The OHS Policy Statement is guided by the Constitution of the Republic of Uganda and other global, national and sectoral regulations and policies. The OHS Policy also takes into recognition of the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.

Relevance to this Project: This policy will be especially relevant for OHS of construction crews and subsequently, operation and maintenance personnel. The policy will also have relevance in mitigation measures that protect the public from health and safety impacts as a result of project construction and subsequent operation and maintenance activities.

4.1.6 HIV/ AIDS Policy, 1992

Current effort to combat HIV/AIDS is characterized by a policy of openness by Government and this has, to a large extent, been emulated by civil society, political and social institutions, and workplaces. HIV/AIDS is recognized by Ministry of Health as a considerable risk in construction of infrastructure projects and it (together with the Ministry of Gender, Labour and Social Development) encourages employers to develop in-house HIV/AIDS policies, provide awareness and prevention measures to workers and avoid discriminating against workers living with or affected by HIV/AIDS.

To ensure HIV/AIDS is addressed in the workplace, the policy encourages employee awareness and education on HIV/AIDS. To protect the infected and affected persons from discrimination, employers are required to keep personal medical records confidential. Employees living with, or affected by, HIV and AIDS, and those who have any related concerns, are encouraged to contact any confidant within the organization to discuss their concerns and obtain information. It is anticipated that during the construction phase, there may be an influx of people into the project area possibly resulting into sexual fraternisation and a risk of HIV/AIDS spread. The policy also guides about HIV/AIDS management including awareness and provision of condoms in workplaces.

Relevance to this Project: The implementation of this project will require labour for the construction, and operation and maintenance of the drainage channels. The influx of workers for this project will introduce new people into the communities, especially residential areas, and could result in sexual fraternization. Whereas jobs may be made available to the local population which would reduce on the influx of immigrants into the project area, the contractors need to develop HIV/AIDS management plans to guide sensitisation meetings and other activities aimed at addressing the issue of spread of HIV/AIDS, in line with this Policy.

4.2 National Legislative Framework

4.2.1 The Constitution of the Republic of Uganda, 1995

The 1995 Uganda Constitution provides that every person has a right to own property (Section 26(1)) and that no person shall be compulsorily deprived of property or any interest in or right over property without prompt payment of fair and adequate compensation, prior to the taking of possession or acquisition of the property.

Article 237 (a) on landownership indicates that government or a local government may, subject to Article 26, acquire land in the public interest. Article 237(b) entrusts the central government or local government with the responsibility to hold in trust for the people and protect, natural lakes, rivers, wetlands, forest reserves and any resources to be reserved for ecological and tourism purposes for the common good of the Ugandan people. Article 39 of the Constitution provides that every Ugandan has a right to a clean and healthy environment.

Relevance to this Project: The implementation of this Project will be conducted in a manner that will incorporate the appropriate safeguards for environmental and social issues, especially land take. Any

land required for the implementation of this Project will be obtained within the confines of the law, after a Resettlement Action Plan (RAP) has been conducted.

4.2.2 National Environment Act, Cap 153

The specific legislation that deals with Environmental Impact Assessments (EIA) in Uganda is the National Environment Act (NEA), Cap 153. The National Environment Management Authority (NEMA) was created under the NEA and mandated with the responsibility to oversee, coordinate and supervise environmental management activities in Uganda. Sections 8(a) and 9(i) of the Third schedule in this Act require that an EIA is prepared in accordance with national EIA Guidelines (1997) and EIA Regulations (1998).

The Act provides for various strategies and tools for environment management, which also include EIA (Section 19) for projects likely to have significant impacts on the environment. NEMA sets multimedia environmental standards (Sections 24-32) to prevent contamination of air, water and soil resources. Section 35 entrusts NEMA, lead agencies and the district environment committee with powers to protect quality of watercourses, permanent or seasonal from human activities that could adversely affect them. Section 56 prohibits discharge of hazardous substances like chemicals, oil, etc. into the environment except in accordance with guidelines prescribed by NEMA.

Relevance to this Project: This Project is categorized under the Third Schedule of the National Environment Act within Section (4) Dams, rivers and water resources as (b) river diversions and water transfer between catchments; (c) flood-control schemes. The implication is that a full ESIA should be undertaken before project implementation. This study is therefore in line with the provisions of this law.

4.2.3 The Land Act, Cap 227

The Land Act provides for tenure, ownership and management of land. Section 44 reiterates the Constitutional mandate for government or a local government to protect environmentally sensitive areas for the common good of the people in Uganda. Section 45 states that the use of land shall conform to the Town and Country Planning Act, now replaced by the Physical Planning Act, 2010 and any other law. Section 71 makes provision for the use and maintenance of existing rights of way as reserved to and vested in the Government on behalf of the public. Sections 76 - 77 makes provision for the jurisdiction of district land tribunals in matters of computation of compensation of land and disturbance allowance in the event of land take.

Relevance to this Project: The extent of works designed to ensure the improvement of Kampala drainage channels will necessitate land take in some sections of the Project Area. Any land required for the implementation of this Project will be acquired in accordance with the provisions of this Act. A Resettlement Action Plan for this Project has been prepared to cater for Project Affected Persons.

4.2.4 The Kampala Capital City Act, 2010

This Act was developed, in accordance with Article 5 of the Constitution, to provide for Kampala as the capital city of Uganda; to provide for the administration of Kampala by the Central Government; to provide for the territorial boundary of Kampala; to provide for the development of Kampala Capital City; to establish Kampala Capital City Authority as the governing body of the city; to provide for a Metropolitan Physical Planning Authority for Kampala. Section 7 lists several functions of the Authority including 1(h) – to construct and maintain major drains. Another function of the Authority is listed as 1(e) – to enact legislation for the proper management of the Capital City.

Relevance to this Project: This Project aimed towards the improvement of priority drainage channels in the City is in direct fulfilment of the KCCA mandate. Table 4-1 *in Section 4.5 provides a list of KCCA bylaws, regulations, ordinances, strategic plan and permits that are applicable to this Project.*

4.2.5 The National Water and Sewerage Corporation Act, Cap 317

The Act sets up National Water and Sewerage Corporation (NWSC) and according to Section 4, mandates it with functions below:

(1) The objects of the corporation shall be to operate and provide water and sewerage services in areas entrusted to it under the Water Act.
(2) The functions of the corporation shall be:

(a) To manage the water resources in ways which are most beneficial to the people of Uganda;

(b) To provide:

i. Water supply services for domestic, stock, horticultural, industrial, commercial, recreational, environmental and other beneficial uses;

ii. Sewerage services, in any area in which it may be appointed to do so under this Act or the Water Act, to the extent and standards that may be determined by its corporate plan, any performance contract, and regulations made under this Act or the Water Act.

(c) To develop the water and sewerage systems in urban centres and big national institutions throughout the country.

Relevance to this Project: A number of water supply and distribution pipes are laid across and besides storm water drainage channels. A sewer line is also in existence along Secondary channel 8. The implementation of the proposed project might require the diversion or relocation of NWSC infrastructure. NWSC was therefore one of the stakeholders consulted during this study.

4.2.6 The Physical Planning Act, 2010

The Physical Planning Act, 2010 replaced the Town and Country Planning Act, Cap 246 which was enacted in 1951 and revised in 1964 but is now inconsistent with contemporary government system in Uganda. The 1951 Act is enacted to regulate and operate in a centralised system of governance where physical planning was carried out at national level through the Town and Country Planning Board. Implementation of the Act was supervised by local governments, especially the urban local governments. Uganda has since gone through many social, political and economic changes. For example, promulgation of the 1995 Constitution established a decentralised system of governance which divulged powers and functions including physical planning, finance and execution of projects from the central government to local governments. This therefore created a need to enact a physical planning legislation which is consistent with this Constitutional requirement. The Physical Planning Act, 2011 establishes district and urban physical planning committees, provides for making and approval of physical development plans and applications for development.

Section 37 of The Physical Planning Act, 2011 requires an EIA permit for developments before they are implemented, stating:

"Where a development application related to matters that require an environmental impact assessment, the approving authority may grant preliminary approval subject to the applicant obtaining an EIA certificate in accordance with the National Environment Act".

Relevance to this Project: This Project is located within Kampala City and has to conform to planning requirements prescribed by KCCA. This Project is in partial fulfilment of the Kampala Drainage Master Plan, 2003.

4.2.7 Workers' Compensation Act, 2000

Section 28 of The Workers' Compensation Act (2000) states that:

- Where a medical practitioner grants a certificate that a worker is suffering from a scheduled disease causing disablement or that the death of a workman was caused by any scheduled disease; and,
- The disease was due to the nature of the worker‘s employment and was contracted within 24 months immediately previous to the date of such disablement or death, the worker or, if he or she is deceased, his or her dependants shall be entitled to claim and to receive compensation under this Act as if such disablement or death had been caused by an accident arising out of and in the course of his or her employment.

Relevance to this Project: This Project will require workers during construction, operation and maintenance phases. Any injury or illness resulting from Project related activities will be subject to conditions of the Workers' Compensation Act. KCCA Labour officers will also be involved in ensuring compliance of the Contractor's' with labour laws.

4.2.8 Employment Act, 2006

The Employment Act is the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management and compensation of workers. The Act is based on the provisions of Article 40 of The Constitution of Uganda. The Act mandates Labour Officers to regularly inspect working conditions of workers to ascertain that rights of workers and basic provisions are provided and workers' welfare attended to.

The Act also provides for the freedom of association of workers permitting workers to join labour organizations. Section 32 addresses the issue of child labour and states that children under the age of twelve years shall not be employed in any business, undertaking or workplace (32(1)). Subsection 32(2) provides restrictions under which a child under the age of fourteen (14) years may be employed; including for light work under the supervision of an adult aged over eighteen (18) years and the work shall not interfere with the child's education.

Relevance to this Project: This Project will require workers during construction, operation and maintenance phases. The working conditions and workers' welfare, including child labour will be governed by the provisions of this Act. The KCCA Labour Officers within the Directorate of Gender Community Services and Production will also be involved in ensuring compliance with the provisions of the Act for this Project.

4.2.9 The Children's Act, Cap 59

This is an Act to reform and consolidate the law relating to children; to provide for the care, protection and maintenance of children; to provide for local authority support for children; to establish a family and children court; to make provision for children charged with offences and for other connected purposes.

Part II of the second schedule of this Act defines a child as a person below the age of eighteen years.

In the same schedule under Section 8of this Act provides that no child shall be employed or engaged in any activity that may be harmful to his or her health, education or mental, physical or moral development.

Relevance to this Project: This Project will require workers during construction, operation and maintenance phases. No child should be employed under project work force requiment however, any employment or engagement of children will be done in line with the restrictions of this Act and the Employment Act to ensure that risks to children are either eliminated, or reduced to as low as reasonably practicable. The contractor will have an *Orientation on all the labour laws including the child labour before starting works. The contractor will consult and involve the Division labour officers*

in each of the divisions to ensure that there is compliance on no child labour during construction of the channels. In addition, the contractor will confirm age of potential labourers prior to hiring through National Identity card, birth certificate or confirming with LC and community elders. KCCA Probation Officers will be available to provide guidance to Contractors and their employees' areas of compliance.

4.2.10 The Penal Code Act, Cap 120 (as Amended, 2007)

This is an Act to establish a code of criminal law. Section 129 criminalizes defilement of girls under the age of eighteen. Section 131 criminalizes procuration of women or girls to become common prostitutes. Sections 136 – 137 criminalizes people who make earnings from prostitution, and Section 139 provides a penalty of imprisonment for seven years for anyone who practices or engages in prostitution.

Relevance to this Project: The Project contractors, both local and international, will have to operate in accordance with the provisions of this law and desist from engaging in commercial sexual exploitation of workers and local community members, especially the children. The Contractors will also have to put in place strict social safeguards to discourage fraternization with the local community that could result in defilement and rape. KCCA will be responsible for the conduct of contractors for the duration of the Project construction phase .It will be the responsibility of KCCA to ensure that the contractors procured do not have any dealings in illegal activities including prostitution. The contractor will be required a grievance management committee to address such issues identified. Guidance notes will need to be prepared to analyses the different cases and proposed mitigation action.

4.2.11 Occupation Safety and Health Act, 2006

The Act requires employers to provide and maintain safe working conditions, and to take measures to protect workers and the public from risks and dangers of their works, at his or her own cost (Section 13). Employers with more than 20 workers should prepare and often revise a written policy with respect to safety and health of workers (Section 14). The contractor therefore is obliged to provide employers with washing facilities, First Aid, facilities for meals and safe access to workplaces.

Relevance to this Project: This Project will require workers during the construction, and operation and maintenance phases. This Act requires KCCA and all contractors to ensure that workers have a safe working environment at all times and that their health is not at risk as a result of the working environment.

4.2.12 The Historical and Monuments Act, Cap 46

This Act provides for the preservation and protection of historical monuments and objects of archaeological pale-ontological ethnographical and traditional interests. Under this Act, the Minister has wide ranging powers to protect any of the above objects and under Section 8, no person whether owner or not shall cultivate or plough the soil so as to effect to its detriment any object declared to be protected or preserved, and no alteration is permitted on any object declared to be protected or preserved. And under Section 11, any person who discovers any object which may reasonably be considered to be a historical monument or an object of archaeological, pale-ontological, ethnographical, and traditional interests is required to report it to the Conservator of Antiquities within 14 days of the discovery.

Relevance to this Project: Any chance find objects, material or infrastructure that may be identified as falling under the category of 'archaeological pale-ontological ethnographical and traditional interests' during the Project implementation will therefore, be reported to the Department of Museums and Monuments for advice and where necessary undergo a forensic assessment. A

procedure for handling any 'chance finds' during Project implementation will be prepared for the protection of Physical Cultural Resources (PCRs) as part of the Environmental and Social Management and Monitoring Plan.

4.3 National Regulatory Framework

4.3.1 Environmental Impact Assessment Regulations, 1998

The regulations require a detailed study to determine possible environmental impacts and mitigation measures. The guidelines require that the EIA process should be participatory engaging the general public and stakeholders in consultations or to inform them and obtain their views about the proposed development during the EIA.

Relevance to this Project: This ESIA study will be conducted with the guidance of these regulations.

4.3.2 National Environment (Noise Standards & Control) Regulations, 2003

Section 7 of these regulations requires that no person shall emit noise in excess of permissible noise levels, unless permitted by a licence issued under these Regulations. Section 8 imparts responsibility onto noise generators to use the best practicable means to ensure that noise does not exceed permissible noise levels. Part IV of the First Schedules states the maximum permissible noise levels at construction sites as 75 dBA and 60 dBA for commercial and residential areas respectively.

Maximum Permissible Noise Levels for Construction Site

Column 1	Column 2	
Noise Control Zone	**Sound Level dB (A) (Leq)**	**Sound Level dB (A) Leq**
	Day	Night
Residential	60	40
Commercial	75	50
Industrial	85	65

Time Frame:

Day : 6.00 a.m - 10.00p.m.

Night : 10.00p.m - 6.00a.m

The time frame takes into consideration human activity.

Source: National Environment (Noise Standards & Control) Regulations, 2003

Relevance to this Project: These regulations are relevant to the Project as the construction activities may generate noise. This regulation explicitly makes the developer (KCCA) responsible for ensuring that noise levels are kept within acceptable limits during the project implementation.

4.3.3 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 its movement into and out of Uganda.

The regulations, which will relate to overall waste management (promote and minimise waste generation) during the construction phase, by:

- eliminating use of toxic raw materials;
- reducing toxic emissions and wastes;
- Recovering and reuse of waste wherever possible.

Relevance to this Project: These Regulations will apply during construction, operation and maintenance phases of the Project. Each of the phases is expected to generate various types and volume of waste, the management of which should conform to these regulations.

4.3.4 The National Environment (Wetlands, River Banks and Lakeshores Management) Regulations, 2000

Regulation 12(1) prohibits any person from carrying out an activity in a wetland without a permit issued by the Executive Director of NEMA. Under regulation 34(1), a developer desiring to conduct a project which may have significant impact on a wetland (for example dredging), river bank or lake shore, shall be required to carry out an environmental impact assessment in accordance with sections 20, 21, and 22 of the NES.

In Regulation 17 (1), every landowner, occupier or user who is adjacent or contiguous with a wetland shall have a duty to prevent the degradation or destruction of the wetland and shall maintain the ecological and other functions of the wetland. The tool used under these Regulations to ensure compliance is the permit. The Executive Director of NEMA can only permit activities in a wetland if he or she is satisfied that such activities shall not degrade the wetland in question.

Relevance to this Project: The system to be improved is drained through wetlands in many areas. Therefore there will be need to seek permission from the Executive Director of NEMA to undertake the project activities within the wetlands.

4.3.5 National Environment (Audit) Regulations, 2006

The Audit Regulations operationalize Section 3 (3)(c) of the Environment Act in which it is a requirement for on- going activities, which are likely to have environmental impacts to be subjected to an environmental audit in accordance with Section 22 of the Act. The regulation also operationalizes the Environmental Impact Assessment Regulation, in which it is a requirement to follow up projects that carried out an EIA with an Audit in at least 12 months and at most within three years after the commencement of the project. The proposed project will therefore be subjected to environmental monitoring, reporting and periodic environmental auditing in compliance with sections 22 and 23 of the National Environment Act.

Relevance to this Project: Having conducted an ESIA for this Project, the Regulations recommend an Audit to be carried out, at most three years after commencement.

4.3.6 Traffic and Road Safety (Speed Limits) Regulations, 2004

As per First Schedule of this Regulation, speed limits specified in column 2 are maximum speed limits in urban areas, trading centres or other built-up areas for the vehicles as shown in table below;

The table below shows Maximum Speed Limit in Urban Areas, Trading Centres and other Built-up Areas.

Vehicle Type	Speed Limit (kilometres per hour)
Motorcars constructed to carry passengers, and motor-cycles	50
Public Service vehicles and private omnibuses with seating accommodation for more than seven passengers exclusive of the driver	50
Motorcars and dual-purpose vehicles that are drawing trailers	50
Light goods vehicles	50
Medium goods vehicles	50
Heavy goods vehicles	50
Tractors	40
Tractors when drawing trailers	30
Engineering plant	30

Relevance to this Project: This Project's will adhere to speed limits 30 km/hr for light vehicles and 20 km/hr for heavy vehicles. These fall in the regulatory Maximum Speed Limit range in Urban Areas, Trading Centres and other Built-up Areas; 50km/hr for Heavy goods vehicles, 40km/hr for Tractors and 30km/hr for Engineering plant.

4.4 Institutional Framework

4.4.1 National Environment Management Authority (NEMA)

The National Environmental Act provides for establishment of NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental conservation activities. NEMA is under the Ministry of Water and Environment but has a cross-sectorial mandate to oversee the conduct of EIA through issuance of EIA guidelines, regulations and registration of practitioners. It reviews and approves environmental impact statements (EIS) in consultation with any relevant lead agencies. NEMA works with District Environment Offices and Local Environment Committees at local government level, which undertake inspection, monitoring and compliance enforcement on its behalf.

Relevance to this Project: NEMA is the agency responsible for making public the findings of this ESIA as well as approving and making recommendations to address any environmental and social impacts as a result of the project implementation.

4.4.2 Ministry of Water and Environment

The Ministry of Water and Environment (MWE) is the lead agency for the provision and management of water supply and sanitation services in Uganda. The Ministry has the responsibility for setting national policies and standards, managing and regulating water resources and determining priorities for water development and management. It also monitors and evaluates sector development programmes to keep track of their performance, efficiency and effectiveness in service delivery. MWE has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA).

4.4.3 Directorate of Water Resources Management (DWRM)

The Directorate of Water Resources Management (DWRM) is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of

water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of trans boundary waters resources and peaceful cooperation with Nile Basin riparian countries. The directorate comprises three departments namely Water Resources Monitoring and Assessments, Water Resources Regulation and Water Quality Management.

Relevance to this Project: The Kansanga and Gaba, and Kinawataka Primary channels drain into Lake Victoria and this could have an impact on the lake's water quality. KCCA will work together with DWRM to ensure that all possible measures are taken to minimize the risk of the lake water pollution, as a result of the Project, to levels that are as low as reasonably practicable. KCCA will obtain any relevant permits for the Project such as water abstraction from DWRM.

4.4.4 Directorate of Water Development (DWD)

The Directorate of Water Development (DWD) is responsible for providing technical oversight for the planning, implementation and supervision of the delivery of urban and rural water and sanitation services across the country, including water for production. The Directorate comprises of four departments i.e. Urban Water Supply Department, Water for Production Department, Rural Water Supply Department and Urban Water Supply Regulation Unit.

Relevance to this Project: KCCA will work together with DWD to ensure that all possible measures are taken to minimize disruption of sanitation in the project area, as a result of the Project development activities. This is especially important for those households whose toilets will be demolished during construction of the channels.

4.4.5 Directorate of Environmental Affairs (DEA)

DEA, under the Ministry of Water and Environment, is mandated to manage all environment related affairs. The Directorate is comprised of five units/departments including Climate Change Unit, Environment Support Services, Forest Sector Support, Meteorology and Wetlands Management.

The Wetlands Management Department (WMD) within the DEA is mandated to manage wetland resources. The Directorate's mandate and goal are to sustain the biophysical and socio economic values of wetlands in Uganda for present and future generations. Wetlands are under a lot of pressure from conversion for residential and industrial developments, agriculture, wastewater treatment facilities, etc. DEA has an inventory of the major wetlands in country in the National Wetlands Information System (NWIS). The inventory provides an overview of wetland resource, their values, threats and possible management options.

Relevance to this Project: Some secondary channels flow through areas with wetland vegetation, while all the primary channels drain into major wetlands of Lubigi, Kansanga-Gaba and Kinawataka. Some areas along the channel routes are within wetlands. The activities carried out in and close to the wetlands will be conducted with the guidance of the WMD.

4.4.6 Ministry of Lands, Housing and Urban Development (MLHUD)

The Ministry of Lands, Housing & Urban Development (MLHUD) is responsible for all matters concerning lands, housing and urban development. The ministry is also tasked to put in place policies and initiate laws responsible for sustainable land management aimed at promoting sustainable housing for all, and fostering orderly urban development in the country. The Ministry has several Directorates which include: Lands; Physical Planning and Urban Development; and Directorate of Housing.

The Office of the Chief Government Valuer (CGV) that is located in the Ministry is mandated to provide reliable real property valuations to government. The responsibilities of the Chief Government Valuer include: advising Government on the real property valuation; Valuing Property for purchase and compensation by Government; Valuing Property for rent by Government; Assessing Stamp Duty; and Advising Government on Rating Properties.

Whereas the Office of the Chief Government Valuer is not established under any particular law, it operates in line with a number of subsidiary legislations that clearly spell out its statutory mandate and obligations. In discharging its functions, the office of the Chief Government Valuer is guided by, among others, the Articles 26 and 237 of the Constitution of Uganda, 1995 together with the Land Acquisition Act, 1965, Cap. 226, Land Act 1998, Cap. 227 and the Registration of Titles Act Cap. 230. Of particular importance is the Constitutional obligation that requires acquiring authorities to comply to "prompt payment of fair and adequate compensation, prior to taking possession or acquisition of the property". This constitutional requirement puts pressure on the Chief Government Valuer to act hastily so that the acquiring authority takes possession as required.

Relevance to this Project: Land take is one of the impacts of this Project. In line with World Bank Safeguard Policy OP 4.12, a Resettlement Action Plan (RAP) is being prepared for the Project. As part of the RAP, a surveying and valuation exercise is being conducted. The results of the valuation exercise will be subject to the approval of the Chief Government Valuer.

4.4.7 Ministry of Gender, Labour and Social Development (MGLSD)

MGLSD is the leading and coordinating agency for the Social Development Sector. In collaboration with other stakeholders, MGLSD is responsible for occupational safety, labour relations, community empowerment, protection and promotion of the rights and obligations of the specified vulnerable groups for social protection and gender responsive development.

Relevance to this Project: The Department of Occupational, Health and Safety (OHS) in the Ministry will be consulted as a Stakeholder to give guidance on the OHS aspects of this Project during this study. During the implementation of the project, the Department of OHS will also be responsible for monitoring compliance of the project activities and working environment with the provisions of the Occupational Safety and Health Act, 2006. KCCA works with the Ministry on policy and strategies regarding of child protection and sexual harassment within Kampala City.

4.4.8 Kampala Capital City Authority (KCCA)

The Kampala Capital City Authority was instituted in 2010, as the governing body of the city on behalf of the Central Government. One of the functions of the Authority is to carry out physical planning and development control in the city, and ensure that development projects, especially construction works, are conducted within the confines of the law. The Authority is also responsible for the construction and maintenance of roads in the city.

Relevance to this Project: KCCA, the Project proponent will be responsible for implementation of all commitments within the developed EIS. The Project Area is under jurisdiction of KCCA which will be responsible for various functions related to the project such as traffic management, waste management, drainage and maintenance of law, order and security. KCCA will also be responsible for issuing permits and licenses associated with project development (as listed in Table 4-1 in Section 4.5). KCCA will also be responsible for ensuring compliance to the relevant laws including those relating to welfare and social protection.

4.5 KCCA Bylaws, Regulations, Ordinances and Strategic Plan

KCCA has enacted several bylaws targeting improvement of various socio-economic and environmental conditions in the city. Outlined below and discussed thereafter, are those applicable to the proposed Project:

i) KCCA Strategic Plan 2014/15-2018/19
ii) The Public Health (Building) Rules *[Statutory Instrument 281—1]*,
iii) The Local Governments (Kampala City) (Street Traders) Bylaws *[Statutory Instrument 243—23],*
iv) The Local Governments (Kampala City Council) (Licensing of Trade Persons) Ordinance, 2006
v) The Local Governments (Kampala City Council) (Markets) Ordinance, 2006.
vi) The Local Governments (Kampala City Council) (Solid Waste Management) Ordinance *[Statutory Instrument 243—21].*
vii) The Local Governments (Kampala City) (Taxi Parks) Byelaws *[Statutory Instrument 243—27]*
viii) The Traffic and Road Safety (Parking of Motor Vehicles) Regulations, 2001.

These are discussed in Table 4-1.

Table 4-1: KCCA Bylaws, Regulations, Ordinances, Strategic Plan and Permits

Legal Instrument	Requirement and Relation to the Project
Bylaws	
The Local Governments (Kampala City) (Street Traders) Byelaws *[Statutory Instrument 243—23].*	Requirement: S.3: "Prohibition of street trading without permit and form of permit". (1) No street trader shall carry on business without a permit from the Town Clerk. ***Relevance to this Project:*** *It is essential to note that roadside vendors, who may tout, hawk foodstuff (bananas, roasted nuts) to construction workers may not be licensed by KCCA and purchasing from them would be abetting illegal business activities.*
Ordinances	
The Local Governments (Kampala City Council) (Licensing of Trade Persons) Ordinance, 2006.	Requirement: S4: A person shall not carry out business within jurisdiction of the City unless he or she is in possession of a licence issued by the City Authority. *Relation to this Project: Any subcontractors, associations or groups hired by the project or its contractors must be duly licensed by KCCA to carry out business.*
The Local Governments (Kampala City Council) (Markets) Ordinance, 2006.	Requirement: S18. (1) A person shall not bring a pet to a market. (3) A person shall not without reasonable cause, enter a market with a stick, knife or any other weapon of any kind. S20: A person occupying a pitch, stall or shop in a market shall keep that pitch, stall or shop and his or her wares clean and shall dispose of all refuse, garbage, offal and waste, liquid or solid, from his or her pitch, stall or shop in accordance with the requirements of the Council. S24: A person shall not drive, cause, allow or permit a motor vehicle other than a motor-vehicle belonging to the Council or the market administrator to enter the market without the permission of the market administrator. S24. A person shall not drive, cause, allow or permit a motor vehicle other

Legal Instrument	Requirement and Relation to the Project
	than a motor-vehicle belonging to the Council or the market administrator to enter the market without the permission of the market administrator S32. (1) A market administrator shall have the power to expel from the precincts of a market any person who conducts himself or herself in a manner likely to cause a breach of the peace. *<u>Relevance to this Project</u>: Project workers during construction must avoid contravening the above-mentioned sections of the market ordinance to avoid legal action. Some sections of storm water channels under the Project are close to or within markets in some areas. Workers and material suppliers will have to operate within the laws governing market places when carrying out Project activities in or near market areas.*
The Local Governments (Kampala City Council) (Solid Waste Management) Ordinance *[Statutory Instrument 243-21].*	Requirement: S4. **Responsibility of owner.** (1) Every owner or occupant of dwelling or commercial premises is responsible for waste generated at those premises until it is collected by the City Authority, its agents or licensed operators. S7. **Storage of solid waste.** (1) Solid waste shall be kept so as not to be easily scattered or blown by wind, and, in durable containers. (2) The waste generator shall ensure availability of sufficient numbers of suitable approved containers for onsite store of refuse at the premises. *<u>Relevance to this Project</u>**:** The project should ensure proper solid waste management provision of waste collection/ storage containers for construction waste (during construction phase) and maintenance waste during the operation and maintenance phase.*
Regulations	
The Traffic and Road Safety (Parking of Motor Vehicles) Regulations, 2001.	Requirement: **Parking places** S5: (1) The Council shall, in consultation with the Minister, identify roads and streets on which the Council shall designate parking places. **Control and management of parking places** S6: The Council or its agent is responsible for the control and management of parking places designated under these Regulations. S14.: **Offences and penalties** A person who— (a) parks in a place which is not a designated parking place; (b) parks a motor vehicle in a no-parking area; (c) parks a motor vehicle in a no-stopping area; (d) parks a motor vehicle in any other area in which parking is prohibited under the Traffic and Road Safety Act 1998; (e) parks a motor vehicle on a pavement; or (f) parks a motor vehicle in a parking place in a manner which obstructs, or is inconsiderate to other road users; *<u>Relevance to this Project:</u> Project vehicles during construction, operation*

Legal Instrument	Requirement and Relation to the Project
	and maintenance, and decommissioning phases must be parked in accordance with these regulations in a manner that does not disrupt traffic flow. The vehicles should not pose risk of public accidents or damage existing roads and road infrastructure.
KCCA Strategic Plan 2014/15-2018/19	
	Aspiration: This Plan lays the foundation for transformation of Kampala City. In the next 4 to 5 years, KCCA seeks to reconstruct and upgrade 80% of the road network to improve mobility and connectivity, create more workspaces, improve the quality of life and develop the human capital needed to support city economic development; create an enabling environment for establishment and growth of businesses, and put in place the necessary systems to support public service delivery. KCCA plans a number of developments under this strategy, such as: I) The Kampala Cable Cars system as an innovative and attractive approach to public transport, which is currently characterised by high travel time and cost.  ii) Electric light rails /metro train services.  iii) Revamping and expansion of street lighting network hence providing security, visibility and ease vehicular and pedestrian traffic movement. iv) Medical Services improvement whereby KCCA will enhance the curative health sector by upgrading of one health unit to general

Legal Instrument	Requirement and Relation to the Project
	hospital status in each of the five urban Divisions of Kampala City.  v) Establishment of model schools in the City. vi) Promote library services. vii) Enhancing the City Security (including management of CCTV in public places) viii) The Kampala Smart City Project to have the City use Information and Communication Technology (ICT) as an enabler to services delivery in smart payments, smart planning, smart transportation, smart environment, smart education, smart communities and social services and smart governance. *<u>Relevance to this project:</u> The KIIDP Project aims to improve the drainage of storm water in Kampala City. Successful project implementation will result in greatly minimizing the occurrence of flooding in the City, and in effect the destruction of property, risk to health and sanitation and general inconveniences and delays that are usually brought about by flooding.* (**Note**: All images in this section were obtained from the Strategic Plan and are copyright of KCCA)

4.6 World Bank Policies and Guidelines

4.6.1 The World Bank Environmental and Social Safeguard Policies

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment during the development process. These policies provide guidelines for bank and borrower staff in the identification, preparation, and implementation of programs and projects. Safeguard policies provide a platform for the participation of stakeholders in project design, and are an important instrument for building ownership among local populations (World Bank, 2006).

The World Bank (WB) environmental and social safeguard policies are listed in Table 4-2 and those triggered by this Project are delved into in detail in the sub-sections below.

Table 4-2: Identification of WB Safeguard Policies that are triggered by the Project

WB Safeguard Policy	Description	Triggered by Project? (Yes/No)

WB Safeguard Policy	Description	Triggered by Project? (Yes/No)
OP 4.01, Environmental Assessment	This policy states that all projects proposed for WB financing require and environmental assessment to ensure that they are environmentally and socially sound and sustainable. The Policy requires all WB Projects to be categorized as 'A', 'B', 'C' or 'IF' depending on the potential project impacts.	Yes. This Project is a Category B project
OP 4.04, Natural Habitats	This Policy affirms WB's commitment to promote and support natural habitat conservation and improved land use, and the protection, maintenance, and rehabilitation of natural habitats and their functions in its project financing	Yes
OP 4.09, Pest Management	The Bank supports the use of biological or environmental control methods rather than the use of pesticides where there is need for pest management	No
OP 4.10, Indigenous Peoples	This Policy affirms WB's commitment to protect indigenous people. This Policy therefore requires for Borrowers and Bank staff to identify indigenous peoples, consult with them, ensure that they participate in, and benefit from Bank- funded operations in a culturally appropriate way - and that adverse impacts on them are avoided, or where not feasible, minimized or mitigated.	No
OP 4.11 Physical Cultural Resources	This Policy aims to assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.	Yes
OP 4.12 Involuntary Resettlement	This Policy is applied wherever land, housing or other resources are taken involuntarily from people. It sets out the objectives to be met and procedures to be followed for carrying out baseline studies, impact analyses, and mitigation plans when affected people move or lose part of their livelihoods.	Yes
OP 4.36 Forestry	This Policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty and encourage economic development.	No
OP 4.37 Safety of Dams	This Policy sets forth WB's requirements for projects where dams are to be constructed.	No
OP 7.50 Projects on International Waterways	This Policy sets forth required agreements and notifications regarding projects that are situated on international waterways	No
OP 7.60 Disputed Areas	This Policy is meant to ensure that projects in disputed areas are dealt with at the earliest possible stage.	No

The WB Operational Principles (OP) that are triggered by this project are further discussed in the sections below.

4.6.1.1 OP/BP 4.01 - Environmental Assessment

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment (Table 4-3). Its purpose is to improve decision making, to ensure that all options under consideration are sound and sustainable, and that potentially affected people have been properly consulted. Environmental Assessment (EA) is one of the 10 environmental, social, and legal Safeguard Policies of the World Bank. EA is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies'.

Table 4-3: WB OP/BP 4.01 Environmental Assessment (Jan 1999)

Objectives	Operational Principals
To help ensure the environmental and social soundness and sustainability of investment projects.	1. Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken proportional to potential risks and to direct, and, as relevant, indirect, cumulative, and associated impacts. Use sectorial or regional environmental assessment when appropriate.
	2. Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources, including trans-boundary and global concerns, and potential impacts on human health and safety.
	3. Assess the adequacy of the applicable legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene such international obligations.
	4. Provide for assessment of feasible investment, technical, and siting alternatives, including the "no action" alternative, potential impacts, feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions, and their institutional, training and monitoring requirements associated with them.
	5. Where applicable to the type of project being supported, normally apply the Pollution Prevention and Abatement Handbook (PPAH). Justify deviations when alternatives to measures set forth in the PPAH are

Objectives	Operational Principals
	selected.
	6. Prevent and, where not possible to prevent, at least minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and planning that includes the proposed mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.
	7. Involve stakeholders, including project-affected groups and local nongovernmental organizations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation as necessary to address EA-related issues that affect them.
	8. Use independent expertise in the preparation of EA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious or that involve serious and multi- dimensional environmental and/or social concerns.
	9. Provide measures to link the environmental assessment process and findings with studies of economic, financial, institutional, social and technical analyses of a proposed project.
	10. Provide for application of the principles in this Table to subprojects under investment and financial intermediary activities.
	11. Disclose draft EA in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.

Relevance to this Project: This Project traverses a wide area, through different economic and environmental settings in Kampala City. This ESIA is intended to identify any social and environmental impacts, and recommend adequate mitigation measures to address them.

4.6.1.2 OP/BP 4.04 - Natural Habitats

This OP seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water areas where most of the native plant and animal species are still present). Specifically, the policy

prohibits Bank support for projects which would lead to the significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats which are either:

- Legally protected,
- Officially proposed for protection, or
- Unprotected but of known high conservation value.

Table 4-4: WB OP/BP 4.04 Natural Habitats (June 2001)

Objectives	Operational Principals
To promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.	**1.** Use a precautionary approach to natural resources management to ensure opportunities for environmentally sustainable development. Determine if project benefits substantially outweigh potential environmental costs.
	2. Avoid significant conversion or degradation of critical natural habitats, including those habitats that are (a) legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value, or (d) recognized as protected by traditional local communities.
	3. Where projects adversely affect non-critical natural habitats, proceed only if viable alternatives are not available, and if appropriate conservation and mitigation measures, including those required to maintain ecological services they provide, are in place. Include also mitigation measures that minimize habitat loss and establish and maintain an ecologically similar protected area.
	4. Whenever feasible, give preference to siting projects on lands already converted.
	5. Consult key stakeholders, including local nongovernmental organizations and local communities, and involve such people in design, implementation, monitoring, and evaluation of projects, including mitigation planning.
	6. Provide for the use of appropriate expertise for the design and implementation of mitigation and monitoring plans.
	7. Disclose draft mitigation plan in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.

<u>Relevance to this Project:</u> Some sections of channels within the Project area interface with wetlands, which are home to species of conservation concern, in varying degrees. Lubigi channel in particular

traverses a degraded wetland section and discharges into the relatively intact section after Hoima Road. The project will give particular attention to wetlands during the design, and implementation so as to minimize any interruption of wetlands. This ESIA identitied the species of conservation concern, assessed the impact of the Project on the identified species in their respective locations, and recommended measures to allow the Project implementation proceed without endangering the identified species of conservation concern and/or their habitats. The ESIA process informed the non-interventions in the wetland systems whereby primary channel designs stop at the start of wetlands.

4.6.1.3 OP 4.11 - Physical Cultural Resources (PCR)

Cultural resources are important as sources of valuable historical and scientific information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The loss of such resources is irreversible, but fortunately, it is often avoidable. The objective of OP/BP 4.11 on Physical Cultural Resources is to avoid, or mitigate, adverse impacts on cultural resources from development projects that the World Bank finances.

Table 4-5: WB OP/BP 4.11 Physical Cultural Resources (July 2006)

Objectives	Operational Principals
To assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.	1. Use an environmental assessment (EA) or equivalent process to identify PCR and prevent or minimize or compensate for adverse impacts and enhance positive impacts on PCR through site selection and design.
	2. As part of the EA, as appropriate, conduct field based surveys, using qualified specialists
	3. Consult concerned government authorities, relevant non-governmental organizations, relevant experts and local people in documenting the presence and significance of PCR, assessing the nature and extent of potential impacts on these resources, and designing and implementing mitigation plans.
	4. For materials that may be discovered during project implementation, provide for the use of "chance find" procedures in the context of the PCR management plan or PCR component of the environmental management plan.
	5. Disclose draft mitigation plans as part of the EIA or equivalent process, in a timely manner, before appraisal formally begins, in an accessible place and in a form and language that are understandable to key

Objectives	Operational Principals
	stakeholders.

Relevance to this Project: The Project area is mostly disturbed, with settlements and industries and hence minimal risk of finding or damaging PCR. However, a chance finds procedure will be shared with contractors during project implementation, to ensure that any 'chance finds' are appropriately handled.

4.6.1.4 OP 4.12 - Involuntary Resettlement

This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

Table 4-6: WB OP/BP 4.12 Involuntary Resettlement (Dec 2001)

Objectives	Operational Principals
To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.	1. Assess all viable alternative project designs to avoid, where feasible, or minimize involuntary resettlement
	2. Through census and socio-economic surveys of the affected population, identify, assess, and address the potential economic and social impacts of the project that are caused by involuntary taking of land (e.g., relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood, whether or not the affected person must move to another location) or involuntary restriction of access to legally designated parks and protected areas.
	3. Identify and address impacts also if they result from other activities that are: A) Directly and significantly related to the proposed project, B) Necessary to achieve its objectives, and C) Carried out or planned to be carried out contemporaneously with the project.
	4. Consult project-affected persons, host communities and local nongovernmental organizations, as appropriate. Provide them opportunities to participate in the planning, implementation, and monitoring of the resettlement program, especially in the process of developing and implementing the

Objectives	Operational Principals
	procedures for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanisms. Pay particular attention to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, Indigenous Peoples, ethnic minorities, or other displaced persons who may not be protected through national land compensation legislation. Ensure that there is a system of providing feedback to Project affected persons in cases where there are any gaps.
	5. Inform displaced persons of their rights, consult them on options, and provide them with technically and economically feasible resettlement alternatives and needed assistance, including: **A)** Prompt compensation at full replacement cost for loss of assets attributable to the project; **B)** If there is relocation, assistance during relocation, and residential housing, or housing sites, or agricultural sites of equivalent productive potential, as required; **C)** Transitional support and development assistance, such as land preparation, credit facilities, training or job opportunities as required, in addition to compensation measures; **D)** Cash compensation for land when the impact of land acquisition on livelihoods is minor; and **E)** Where physical relocation is necessary, provide temporary housing, permanent housing sites, and resources (in cash or in kind) for the construction of permanent housing—inclusive of all fees, taxes, and utility hook-up charges—or, as required, agricultural sites for which a combination of productive potential, locational advantages, and other factors are at least equivalent to the advantages of the old site. **F)** Provision of civic infrastructure and community services as required.
	6. Give preference to land-based resettlement strategies for displaced persons whose livelihoods are land-based.

Objectives	Operational Principals
	7. For those without formal legal rights to lands or claims to such land that could be recognized under the laws of the country, provide resettlement assistance in lieu of compensation for land to help improve or at least restore their livelihoods.
	8. Disclose draft resettlement plans, including documentation of the consultation process, in a timely manner, before appraisal formally begins, in an accessible place and in a form and language that are understandable to key stakeholders
	9. Apply the principles described in the involuntary resettlement section of this Table, as applicable and relevant, to subprojects requiring land acquisition.
	10. Design, document, and disclose before appraisal of projects involving involuntary restriction of access to legally designated parks and protected areas, a participatory process for: **A)** preparing and implementing project components; **B)** establishing eligibility criteria; **C)** agreeing on mitigation measures that help improve or restore livelihoods in a manner that maintains the sustainability of the park or protected area; **D)** resolving conflicts; and **E)** Monitoring implementation.
	11. Implement all relevant resettlement plans before project completion and provide resettlement entitlements before displacement or restriction of access. For projects involving restrictions of access, impose the restrictions in accordance with the timetable in the plan of actions
	12. Assess whether the objectives of the resettlement instrument have been achieved, upon completion of the project, taking a count of the baseline conditions and the results of resettlement monitoring.

Relevance to this Project: The Project area is mostly inhabited, and very densely populated in some parts. The designs for drainage improvement will require widening of the channels in some parts and realignment in others, hence relocation or disturbance of some residents. Any involuntary resettlement or compensation of residents will be conducted with the guidance of relevant Ugandan laws and this OP. A Resettlement Action Plan (RAP) was developed as a stand-alone document for this

Project. The RAP provides guidance, based on relevant Ugandan laws and the WB Guidelines as set out in this Policy.

4.6.2 World Bank EIA Guidelines

The World Bank classifies projects into four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

Category A: 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 the area broader than the sites or facilities subject to physical works. The Environmental Assessment for a project in this category examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives including the 'without project' situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve an environmental performance.

Category B: 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. These impacts are site specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects. The scope of Category B projects may vary from project to project, but it is narrower than that of Category A.

Category C: A proposed project is classified as Category C if it is likely to have **minimal or no adverse** environmental impacts.

Category FI: A proposed project is classified as a category FI if it involves investment of Bank funds through financial intermediary, in subprojects that may result in adverse environmental impacts.

Relevance to this Project: This Project is a Category B Project since it will have potential adverse environmental impacts on human populations and environmentally important areas – including wetlands. Most of these impacts are expected to be site specific.

4.6.3 World Bank Environmental, Health and Safety General Guidelines

The Environmental, Health, and Safety (EHS) Guidelines (2007) are technical reference documents with general and industry-specific examples of Good International Industry Practice. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.

According to the WB EHS Guidelines (2007), effective management of EHS issues for any Project includes:

- Identifying EHS project hazards and associated risks as early as possible in the facility development or project cycle;
- Involving EHS professionals, who have the experience, competence, and training necessary to assess and manage EHS impacts and risks, and carry out specialized environmental management functions including the preparation of project or activity-specific plans and procedures;
- Understanding the likelihood and magnitude of EHS risks, based on:

- The nature of the project activities, such as whether the project will generate significant quantities of emissions or effluents, or involve hazardous materials or processes;
- The potential consequences to workers, communities, or the environment if hazards are not adequately managed, which may depend on the proximity of project activities to people or to the environmental resources on which they depend.

- Prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment, focusing on the prevention of irreversible and / or significant impacts;
- Favoring strategies that eliminate the cause of the hazard at its source, for example, by selecting less hazardous materials or processes that avoid the need for EHS controls;
- When impact avoidance is not feasible, incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences, for example, with the application of pollution controls to reduce the levels of emitted contaminants to workers or environments;
- Preparing workers and nearby communities to respond to accidents, including providing technical and financial resources to effectively and safely control such events, and restoring workplace and community environments to a safeand healthy condition;
- Improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

The General EHS Guidelines (2007) relevant to this Project are summarized in

Table 4-7:

Table 4-7: World Bank General EHS Guidelines relevant to this Project

Aspect	Relevance to Project
1. Environmental	
1.1 Air Emissions and Ambient Air Quality This guideline applies to facilities or projects that generate emissions to air at any stage of the project life-cycle. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts.	This guideline is relevant because fugitive emissions are expected during the construction phase of this Project. These guidelines will be referenced for acceptable air quality levels during Project implementation, particularly for fugitive sources.

Aspect	Relevance to Project
1.3 Wastewater and Ambient Water Quality This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or stormwater to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.	This Project is primarily about storm water conveyance to receiving streams. As the guidelines state, Rapid runoff, even of uncontaminated stormwater, also degrades the quality of the receiving water by eroding stream beds and banks. These guidelines will be referenced for principles of HSE regarding storm water management, to improve efficiency and sustainability of the Project.
1.6 Waste Management These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors. Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste); and residual waste from industrial operations, such as boiler slag, clinker, and fly ash. Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.	This Project will produce waste during demolition of existing structures, including pit latrines, along the channel width and reserve width before construction; and construction-related waste during the construction period. The operation and maintenance phase also has a significant element of waste management since dredging and cleaning of the channels will be an important part of maintenance operations. These guidelines will be referenced for principles of HSE regarding waste management during the life of this Project.

<table>
<tr><th>Aspect</th><th>Relevance to Project</th></tr>
<tr><td>

1.7 Noise

This guideline addresses impacts of noise beyond the property boundary of the facilities. Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception.

<table>
<tr><th colspan="3">Noise Level Guidelines[54]</th></tr>
<tr><td></td><td colspan="2">One Hour LAeq (dBA)</td></tr>
<tr><td>Receptor</td><td>Daytime
07:00- 22:00</td><td>Nighttime
22:00 - 07:00</td></tr>
<tr><td>Residential: Institutional; educational[55]</td><td>55</td><td>45</td></tr>
<tr><td>Industrial; commercial</td><td>70</td><td>70</td></tr>
</table>

[54]Guidelines values are for noise levels measured out of doors. Source:

Guidelines for Community Noise, World Health Organization (WHO), 1999.

[55]For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO (1999).

</td><td>

In most sections, the channels within this Project are in residential areas and very close to houses. In some instances the channels are very close to schools and health care institutions which are considered very sensitive receptors.

Noise emissions shall be monitored against the WB's guidelines during construction, operation and maintenance:

Note: Since these noise levels are more stringent than the national levels as presented in Section 4.3.2, then they will be referenced during Project implementation.

</td></tr>
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1.8 Contaminated Land

This guideline provides a summary of management approaches for land contamination due to anthropogenic releases of hazardous materials, wastes, or oil, including naturally occurring substances. Releases of these materials may be the result of historic or current site activities, including, but not limited to, accidents during their handling and storage, or due to their poor management or disposal. Contaminated lands may involve surficial soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and adjacent sites.

When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts.

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In some sections, pit latrines were found to line the channel widths, with the reported common practice of having these emptied into the stormwater channels. In the proposed channel extents, a number of pit latrines will have to be demolished and sludge removed from site during excavation. In this regard, this guideline will be referenced by Contractors and KCCA Sanitation Teams.

</td></tr>
<tr><td colspan="2">2. Occupational Health and Safety</td></tr>
</table>

Aspect	Relevance to Project
2.2 Communication and Training This includes guidelines for OHS Training, Visitor Orientation, New task employee and contractor training, Area signage, labelling of equipment, communicate hazard codes, among others. Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees.	Supervising Consultants and Contractors for the Project will have to ensure that OHS requirements for the Project are met in line with these guidelines.
2.3 Physical Hazards Physical hazards represent potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries, from minor and medical aid only, to disabling, catastrophic, and/or fatal. Multiple exposures over prolonged periods can result in disabling injuries of comparable significance and consequence. Sources of potential for such injury include rotating and moving equipment, noise, vibration, eye hazards, industrial vehicle driving and site traffic, ergonomics, repetitive motion, manual handling, among others.	During demolition of existing structures, construction of channels and channel crossings and during maintenance such as dredging, equipment and machinery which generate noise and vibrations will be used. These operations will be guided by these guidelines.
2.7 Personal Protective Equipment (PPE) Personal Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems. PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of personal protection.	Supervising Consultants and Contractors for the Project will have to ensure that PPE requirements for the Project are met in line with these guidelines. PPE will be provided (as required) for eye and face protection, head protection, hearing protection, foot protection, hand protection, respiratory protection, body/leg protection
2.9 Monitoring Occupational health and safety monitoring programs should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies.	Stringent monitoring of HSE aspects will be crucial for the successful implementation of the Project, to have risks reduced to levels that are as low as reasonably practicable.
3. Community Health and Safety	

Aspect	Relevance to Project
3.1 Water Quality and Availability Groundwater and surface water represent essential sources of drinking and irrigation water in developing countries, particularly in rural areas where piped water supply may be limited or unavailable and where available resources are collected by the consumer with little or no treatment. Project activities involving wastewater discharges, water extraction, diversion or impoundment should prevent adverse impacts to the quality and availability of groundwater and surface water resources. Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand.	In some areas, there's potential for the Project to impact on water quality and availability. Where water pipes cross or traverse the channels, some disruption during Project implementation will be expected. Measures, in line with these guidelines will be put in place.
3.2 Structural Safety of Project Infrastructure Hazards posed to the public while accessing project facilities may include: Physical trauma associated with failure of building structures; Burns and smoke inhalation from fires; Injuries suffered as a consequence of falls or contact with heavy equipment; Respiratory distress from dust, fumes, or noxious odours; Exposure to hazardous materials; Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily.	The Project locations are within residential areas, with some having heavy foot traffic. This poses a risk of injury to people walking along or near the channels during construction. This guideline will be referenced in line with the integrity of the structures and any hoarding installed.
3.4 Traffic Safety Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on private or public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents. Road safety initiatives proportional to the scope and nature of project activities.	The Project sites are in some instances crossing roads or along roads and work in these sections will disrupt traffic. Delivery of materials and movement of equipment for the Project will also impact traffic. This guideline will be referenced in line with traffic safety during Project implementation.

Aspect	Relevance to Project
3.6 Disease Prevention Communicable diseases pose a significant public health threat worldwide. Health hazards typically associated with large development projects are those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections. Communicable diseases of most concern during the construction phase due to labour mobility are sexually-transmitted diseases (STDs), such as HIV/AIDS. Recognizing that no single measure is likely to be effective in the long term, successful initiatives typically involve a combination of behavioural and environmental modifications. Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease.	The risk of spread of communicable and vector-borne diseases exists, particularly due to potential influx of Project workers and water impoundment in some cases, as required during construction. This guideline will be referenced in line with disease prevention in the Project communities.
3.7 Emergency Preparedness and Response All projects should have an Emergency Preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements: Administration (policy, purpose, distribution, definitions, etc.); Organization of emergency areas (command centres, medical stations, etc.); Roles and responsibilities; Communication systems; Emergency response procedures; Emergency resources; Training and updating; Checklists (role and action list and equipment checklist); Business Continuity and Contingency.	On any construction site, there is a potential that risks will occur. It is important to have measures in place to readily contain and respond to any risks when they occur. This guideline will be referenced in line with emergency preparedness and response.
4. Construction and Decommissioning	
4.1 Environment Guidelines on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities include: Noise and vibration, soil erosion, sediment mobilization and d transport, air quality, solid waste, hazardous materials, wastewater discharges, and contaminated land.	These impacts are applicable to this Project, and will be addressed in line with these specific guidelines.

Aspect	Relevance to Project
4.2 Occupational Health and Safety Guidelines are provided on aspects of OHS including over-exertion, slips and falls, work in heights, struck by objects, moving machinery, dust, confined spaces and excavations, and other site hazards.	These impacts are applicable to this Project, and will be addressed in line with these specific guidelines.
4.3 Community Health and Safety Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards.	These impacts are applicable to this Project, and will be addressed in line with these specific guidelines.

4.7 Discrepancies between Uganda Laws and World Bank Policies

In general, the Uganda Government Policy is fairly similar to that of the bank apart from a few disparities at a micro level. For instance: the Ugandan Laws restrict themselves to fair, adequate and prompt compensation (cash), while the Bank Policy extends it to providing alternative land and resettling the affected persons. In Uganda compensation is based on the right of ownership. The WB Policy on Involuntary Resettlement is fundamentally different from this, and states that affected persons are entitled to some form of compensation whether or not they have legal title if they occupy the land by a specified cut-off date. The higher of the two standards has been followed in the RAP for this project, since that procedure also satisfies the requirements of the lesser standard. While the WB policy on involuntary resettlement (whose objective is that affected people must be assisted through rehabilitation to restore their standard of living to pre-project levels) is superior to that of the Uganda Government, it falls short of international best practice, which sets the objective of improving affected peoples' social and economic well-being and standards of living – The WB has language on improving affected peoples' standard of living in several sections of the policy, improvement is not stated up front as a core.

A comparison of Uganda Law and WB requirements with possible mitigation options regarding ESIA and compensation options for RAP is given in Table below:

Types of Affected Persons/ Lost Assets	Ugandan laws	World bank 4.12	Applicable standards
ENVIRONMENTAL			
Policy Statement	The Uganda Government's Policy is implicit where by environmental management tools, like environmental assessments, are used as a sustainability assurance rather than impact mitigation mechanism;	The Bank's Policy is explicit to the effect that environmental management tools, like environmental assessments, shall be used as a sustainability assurance rather than impact mitigation mechanism;	The project environmental tools documented in this report have been explicit.
Maximum Allowable Ambient Noise Levels	Part IV of the First Schedules states the maximum permissible noise levels at construction sites as 75 dBA and 60 dBA for commercial and residential areas respectively	IFC General EHS Guidelines states the maximum permissible noise levels at construction sites as 70 dBA and 55 dBA for commercial and residential areas respectively	The project will take on speed limits 30 km/hr for light vehicles and 20 km/hr for heavy vehicles which fall in regulatory Maximum Speed Limit range in Urban Areas for both cases.
RAP			
Owners of non-permanent buildings	Mailo tenure involves the holding of land in perpetuity. It was established under the Uganda Agreement of 1900. It permits the separation of ownership of land from the ownership of developments on land made by a lawful occupant. Owners of non-permanent buildings are entitled to compensation based on rates set by District Land Boards and disturbance allowance (15%).	For those without formal legal rights to lands or claims to such land or assets that could be recognized under the laws of the country, Bank policy provides for resettlement assistance in lieu of compensation for land, to help improve or at least restore their livelihoods.	Project will provide compensation based on replacement cost (value of asset to be compensated will not be assessed according to depreciation) Compensation will be made available prior to displacement OP4.12 prevails

Owners of permanent buildings	Valuation of buildings is based on open market value for urban areas and depreciated replacement cost in the rural areas.	Entitled to in-kind compensation or cash compensation at full replacement cost including labor and relocation expenses, prior to displacement	Project will provide compensation based on real replacement cost (no depreciation). OP4.12 prevails
Land Tenants	Entitled to compensation based on the amount of rights they hold upon land under relevant laws. Illegal tenants are not entitled to compensation	PAPs are entitled to some form of compensation whatever the legal/illegal recognition of their occupancy.	Compensation will be made available prior to displacement OP4.12 prevails
Relocation and resettlement	Both The Constitution, 1995 and The Land Act, 1998 gives the government and local authorities power to compulsorily acquire land. The Constitution states that "no person shall be compulsorily deprived of property or any interests in or any right over property of any description except" if the taking of the land necessary "for public use or in the interest of defense, public safety, public order, public morality or public health."	To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	Project will provide compensation based on real replacement cost (no depreciation).
Grievance mechanism and dispute resolution	The Land Act, 1998 states that land tribunals must be established at all districts. The Land Act empowers the Land Tribunals to determine disputes and it provides for appeal to higher ordinary courts. The Land Acquisition Act provides for the aggrieved person to appeal to the High Court.	Establish appropriate and accessible grievance mechanisms.	Grievance committees to be instituted within the procedure but will not replace the existing legal process in Uganda rather it seeks to resolve issues quickly so as to expedite receipt of entitlements and smooth resettlement without resorting to expensive and time-consuming legal action. If the grievance procedure fails to provide a settlement, complainants can still seek legal redress.

4.8 Acquisition of Requisite Permits for the Project

Implementation of the Project will require KCCA to obtain the necessary permits in line with the laws of Uganda. Table 4-8 provides a list of the identified permits that KCCA will obtain before implementation of the proposed drainage improvement project. KCCA will work with the various government agencies and identify and obtain any other permits deemed necessary for Project implementation.

Table 4-8: Permits to be acquired for Project implementation

Permit	Responsible Agency	Reason for Permit
Surface Water abstraction permit	DWRM	• Water abstraction for construction works from natural water courses.
Permit to carry out a regulated activity in a wetland/riverbank/lakeshore	NEMA	• Construction or excavation within a wetland and/or water body such as a lake or river.
Permit for demolition of existing structures	KCCA	• Demolition of structures within the project area e.g. perimeter walls, pit latrines, houses too close to the channels, existing lining of drainage channels in some sections that will have to be expanded.
Permit for excavation	KCCA	• Excavation of wider channel cross-sections • Excavation for retention pond area • Tunnelling or deep excavation for inter-catchment transfer infrastructure.
Permit for hoarding and scaffolding	KCCA	• Hoarding may be required in areas that are very close to residential houses, for safety purposes. • Scaffolding may be required in sections that have loose soils, or require deep excavations, for the safety of construction workers.
Certificate of good structural practice	KCCA	• The designs for drainage infrastructure will have to be approved, as being in accordance with the latest British or Euro codes of Practice, by the Directorate of Engineering and Technical Services in KCCA.

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 Kampala District Baseline

The proposed drainage improvement project is located in Kampala City, which has five administrative divisions. *Map 5-1* shows location of the City's five administrative divisions of Kawempe, Lubaga, Nakawa, Makindye and Kampala Central.

5.1.1 Geographical Location

Kampala is located at the centre of Uganda's "urbanised" corridor. It is more developed in terms of infrastructure, urbanisation, industrialisation, commerce and trade than other districts within Uganda. However, as it develops greater industrialisation and urbanisation, Kampala is experiencing environmental stresses including habitant destruction, pollution, occupational health risks, deforestation and wetland destruction. The location of Kampala district within Uganda is indicated on *Map 5-1*.

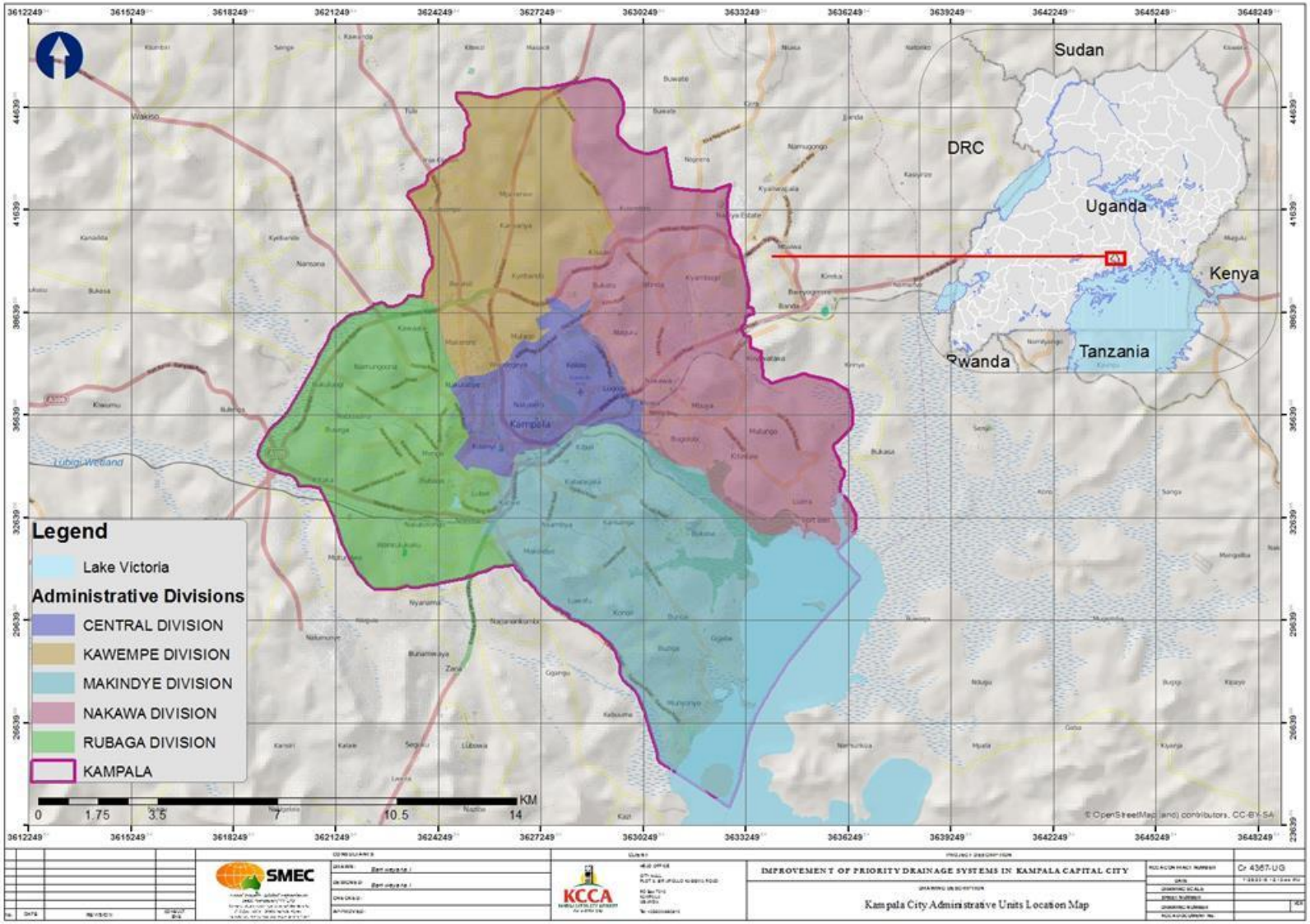
5.1.2 Administrative Units

In 2010, the Ugandan government passed *Kampala Capital City Authority Act*, which established Kampala Capital City Authority to administer Kampala City on behalf of the Central Government. The city's administrative structure as defined under the Act is comprised of divisions headed by a Mayor and Town Clerk, the divisions are comprised of parishes with villages/zones being are the lowest administrative units. Kampala Capital City Authority Act 2010 retained the administrative units that existed in the former Kampala City Council. Table 5-1 shows administrative structure of Kampala city, also illustrated in *Map 5-1*. The Project area of influence is the entire Kampala Capital City.

Table 5-1: Administrative structure of Kampala City

Divisions (Local council 3)	Parish (Local Council 2)	Zone/ Village(Local Council 1)
Central	20	138
Kawempe	22	122
Makindye	22	132
Nakawa	23	279
Lubaga	13	131
Totals	**100**	**802**

Source: Updating Kampala Structure Plan and Upgrading the Kampala GIS Unit, KCCA, 2012



Map 5-1: Kampala District location and Administrative divisions

5.1.3 Climate

Kampala features a tropical wet and dry climate. However, due to city's higher altitudes, average temperatures are noticeably cooler than is typical for other towns with this type of climate. Kampala seldom gets very hot during the course of the year, the warmest month being January. The average temperature for Kampala is 21.9°C, with an annual range of 2.4°C with relative humidity of about 53 to 89%. Another aspect of Kampala's weather is its two distinct wet seasons (Figure 5-1). There is a long rainy season from August to December and a shorter one between February and May. The site falls within climatic Zone B according to the Uganda Hydro-climatic Study (2001). The zone receives an average of 1,270 mm of rainfall per year which is principally spread over two (2) rainy seasons. During wet period some impacts including soil erosion are prone to occur while dust emission would be suppressed to a certain extent. This understanding is important when planning for the construction schedules with regard to environmental impact mitigation.

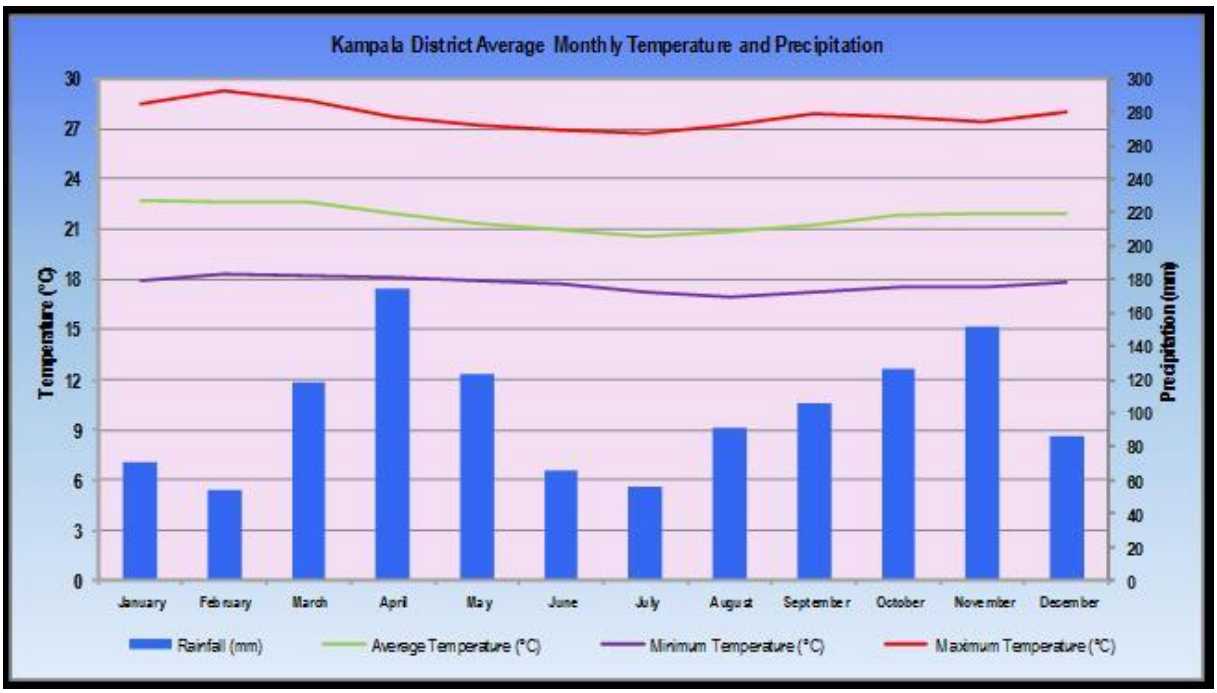


Figure 5-1: Graph of Kampala temperature and rainfall data

5.1.4 Topography

Kampala is located 1120 m above sea level within a series of hills of flat summits and undulating slopes ending into broad valleys dissected by perennial streams/channels. Topography varies in a general east to west direction. The channels are drained within the wetlands located in the valleys.

5.1.5 Wetlands

Major surface water bodies around Kampala include Lake Victoria and the Victoria Nile with dendrites and tributaries that originate from the upland terrain. These form the major wetland areas of Kampala area along their shores and banks.

Kampala district has a total area of approximately 195 km2 of which 32 km2, or 16% is covered by wetlands (MWE, 2000). The wetlands are part of Lake Victoria and Victoria Nile catchment. Most of

the wetlands in the district occupy shallow valleys between the many hills within the district urban areas of Kampala (the capital city).

By 1999 approximately 15 km2 or 46%of wetland area was converted. Given the growth of the city over the last 15 years, over half of the would-be wetland area of Kampala district is converted. This implies that it is critical to protect the remaining wetlands for the benefit of operations within Kampala City.

Most of the channels redesigned including Kinawataka, Kansanga-Gaba and Kinawataka Primary channels are drained through these wetlands before they discharge into the receiving water bodies. Lubigi and Kinawataka wetlands are vital for flood control and tertiary wastewater treatment for Kampala City (NEMA, 2011).

Proximity to urban areas of Kampala City have resulted in increased conversion of wetland areas to other uses including residential development, farming, brick making and sand mining. The conversion of wetlands has been enhanced by population increase, climate change that contributes to deepening water table, complex land ownership framework, ambiguous political commitment and related regulatory enforcement.

5.1.6 Geology and Soils

Kampala city is underlain by pre-Cambrian rock systems of undifferentiated gneiss and granite. Kampala's soils are ferralitic soils with no minerals and mainly characterised by Buganda Catena, and Kabira/katena and kaku series. In low lying areas however, soils are clay with poor drainage and difficult to construct through.

5.1.7 Demographics

According to the 2014 national census figures, Kampala then had a population of approximately 1,516,210 (See Table 5-2). At a national scale, the National Population and Housing Census 2014 stated between 2002 and 2014, the national population increased from 24.2 million to 34.9 million. That gives an average annual growth rate of 3.03 percent. At this rate of growth, the population of Uganda is projected to increase to 35.0 million in 2015 and further to 47.4 million in 2025.

Table 5-2: Population of Kampala District by Sex, Residence and Population Type 2014

District	Sex		Residence		Population Type		Total
Kampala	Male	Female	Urban	Rural	Household	Non-household	
	722,638	793,572	1,516,210	-	1,475,813	40,397	1,516,210

Source: Census Report, 2014

Kampala Capital City has remained the primate urban centre throughout the period 1991 - 2014. However, the proportion of Kampala city to the total urban population has declined steadily from 41 percent in 1991 to 25 percent in 2014, showing that the smaller urban areas are growing faster. Between 2002 and 2014, Wakiso Town Council showed the highest growth rate (11.9 percent), followed by Hoima Municipality (10.7 percent), Mukono Municipality (10.4) Masindi Municipality (8.9 percent), Mbarara Municipality (8.6 percent) and Kasese Municipality (5.3 percent). All these except Wakiso Town Council had boundary changes between 2002 and 2014. The other urban centres had growth rates lower than 5 percent per annum, which is deemed normal for an urban centre.

Table 5-3: Kampala Population by Division

Division	Households		Population		Total
	Number	Average size	Males	Females	
Central	23,205	3.2	41,107	38,682	79,789
Kawempe	94,574	3.5	159,800	78,512	238,312
Makindye	110,224	3.5	188,537	206,739	395,276
Nakawa	84,793	3.6	154,841	163,606	318,447
Lubaga	105,991	3.6	178,353	206,033	384,386

Source: Census Report 2014

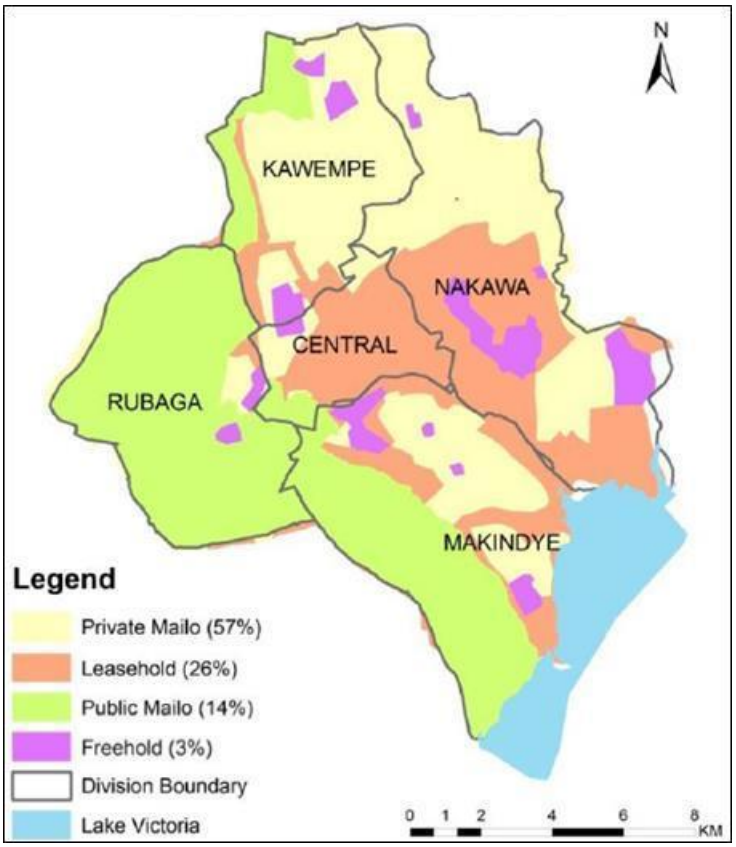
5.1.8 Urban Labour Force Indicators

UBOS conducted Urban Labour Force Surveys (ULFS) in 2009 and 2010 with the aim of providing up-to-date information on "Greater Kampala" area, comprising of Kampala City and the highly urbanized sub-counties of Wakiso and Mukono districts. The total labour force during the 2010 survey was estimated to be 1,098,000, having increased from 920,000 in the 2009 survey, an increase of 19.3 percent. The overall unemployment rate was about 13 percent, while the time related underemployment rate reduced from 12.2 percent to 4.2 percent. The results indicate that 29.1 percent of the workforce had either primary level or no education in 2010, compared to 31.5 percent in 2009. About 22 percent of the work force had post-primary training. About 36.1 percent of the working population by occupation were service workers, shop and market workers (trade) during 2010, indicating a drop of about 2 % compared to 2009 survey. These statistics indicate that labour available in the city is considerably literate.

5.1.9 Land Use and Land Tenure System

Land ownership in Kampala is under the Mailo, Leasehold, Freehold and Customary tenure systems (MoLHUD & UNDP, 2008). These are the four tenure systems through which land can be held in Uganda and are stipulated in Article 237 of the 1995 Constitution of Uganda. Mailo is the dominant land tenure system in Kampala. There are multiple rights to land under Mailo and Freehold tenure systems; rights of the registered landowners and rights of Kibanja occupants who own developments on land, rights of Kibanja occupants are contested and poorly administered, and rights for land under Leasehold tenure are fairly well managed. The map in Map 5-2 gives general indications of land holding under different land tenure systems in Kampala.

The principle land use in Kampala City is dominated by residential use and small-scale agriculture. Small-scale peri-urban agriculture is widely distributed in exiting residential areas as well as periphery areas, which may not have been transformed into other uses. According to the Uganda First Urban Project, 1993, Kampala Urban Study, agricultural land occupied 41.2% of the land while residential occupied 32.3%, both of which formed the major uses in the city. In terms of distribution by agricultural land, Nakawa Division occupies 35% followed by Makindye with 24.5% and Kawempe by 20.6%. These three Divisions have historically had the largest areas of agricultural land because they formed the bigger part of the peri-urban Kampala, which was still largely semi-rural. Land ownership and rights over land are variable within the City. Kampala has experienced rapid growth, and this has had a big influence on housing conditions. A total of 54% of the population live in tenements, while 12% live in stores and garages.



Source: KCCA GIS unit

Map 5-2: Distribution of Land tenure systems in Kampala

Over 60% of the Greater Kampala Metropolitan Area (GKMA, which is the area within 20 km of the center of Kampala City including Mukono, Bombo, Wakiso, Entebbe and Gayaza) remains undeveloped but KCCA is almost entirely built-up and as of 2012, vacant land constitutes less than 10% of the KCCA's landmass, with another 7% being wetlands. The most of development is residential covering about 23% of the GKMA landmass (over 60% of the total developed areas in the GKMA) and some 64% of the KCCA landmass (over 60% of the total developed areas in the KCCA). Employment associated uses account for barely 3% of the GKMA land mass and public services and facilities only 2%. For the KCCA landmass these figures are 10% and 6% respectively. With the KCCA largely built-up, peri-urban development is restricted to the KMTC (11% of the GKMA landmass or 13% of the Kampala Metropolitan Towns, Counties and sub-Counties -KMTC).

Growing concentrically from its very establishment, Kampala has expanded and developed in the same pattern over the past century. Growth has continuously extended along the primary movement routes, later filling in the gaps between the various routes. The gaps between the radial arms begin to close as development along the route widens out, achieving an effective balance in access time to the centre. The GKMA is effectively composed of the following:

i) The Metropolitan Core - the **City Centre**;
ii) An Inner Ring - the **Inner City Suburbs** - with only minor gaps in the ring defined by significant natural constraints (channels and large wetlands) to the south-east;
iii) An Outer Ring - the **Outer Dormitory Towns and Suburbs** - with gaps to the south and east again defined by the same natural constraints; incorporating most of Kira and Nansana Towns;

iv) **Peripheral Towns** - specifically Entebbe (distinctly the most urbanised), Mukono (with a small, weak urbanised centre) and Wakiso (with a town centre reminiscent of an enlarged village centre).

v) Significant **Peri-Urban** extension "fingers" to the south-west towards Entebbe (with a peri-urban extension developing from Entebbe north east towards Kampala) and to the east towards Mukono.

To the north east of the City, particularly and to the north, the peri-urban extensions are clearly closing the gaps and creating a significant section of the next ring of settlement around Kampala. To the North West and west, the extensions are less pronounced, more "stumps" than "fingers", primarily the result of natural barriers and access constraints.

vi) The **Rural** Periphery - the immediate rural hinterland of the City.

The City Centre concentrates much of Kampala's non-residential activities, over 40% of the annual economic product of the City. Hence its land area is largely dedicated to economic, industrial and institutional uses and its relative share of population and the resultant residential densities are low. Its built area density is relatively high concentrating most of the multi-storey buildings in the CBD.

The drainage improvement project traverses a wide area and hence is influenced by a variety of surrounding communities and land uses, such as slum areas (Katanga, Makerere Kikoni) , commercial centres (Wandegeya, Mulago, Nakulabye), markets, education institutions (Makerere University, and numerous secondary, primary add pre-primary schools), hospitals (Mulago Hospital), among others. Sections of the Kampala Northern Bypass are also within the project area of influence.

5.1.10 Health and Sanitation

Health facilities within Kampala City are presented in Table 5-4. Number of Health units in Kampala was 200, 200, and 250 in year 2007, 2009 and 2010 respectively. Table 5-5 presents information relating to typical health indicators for Kampala.

Table 5-4: Health facilities within Kampala City

Kampala	Numbers
Government	20
NGO	40
Private	1332
Total	1392

Source: UBOS Report 2014

Table 5-5: Health Indicators in Kampala City

Health Indicators	Kampala
Total fertility rate	5.21
Teenage pregnancy rate	18.5
Below 5 years mortality ratio	129.0
Infant mortality ratio	83.0
Life expectancy rate	56.4 years
Cause for specific mortality rates	

Health Indicators	Kampala
Malaria	15%
Diarrhoea Diseases	12.3%
Respiratory Tract Infections	9.9%
HIV/AIDS	8.1%

Source: OVC Service Provider Mapping Report, 2008

5.1.11 Literacy and Education

The Uganda National Household Survey (UNHS) defines literacy as ability to read with understanding and write a meaningfully sentence in any language. The 2012/13 UNHS showed an overall literacy rate of 71 percent among persons aged 10 years and above. Findings reveal that men are more literate than their female counterparts with literacy rates of 77 and 65 percent respectively. A trend analysis indicates a slight increase in the literacy rate over the years for persons 10 years and above from 69 percent in 2005/06 to 71 percent in 2012/13. Table 5-6 presents the literacy levels in Kampala city.

Table 5-6: Literacy levels for population aged 10 years and above

Years	Male (%)	Female (%)	Average (%)
2005/2006	92	90	91.0
2009/2010	95	90	92.5
2012/2013	95	92	93.0

Source: UNHS 2005/06, UNHS 2009/10 and UNHS 20012/13, Uganda Bureau of Statistics

Schools will be one category of impact receptors during implementation of the proposed drainage improvement project that will be affected. Impacts may include accidents to school children, severance of access channel crossings, and exposure to noise and dust emissions.

Kampala has had its number of primary school pupils almost triple since Government introduced Universal Primary Education (UPE) in 1997. In 1995 there were 2.63 million pupils in primary schools rising to 7.41 million in 2007, according to the Education Information Management System, and these figures show almost equal representation of boys and girls.

Kampala has different types of education institutions that include:

- Government-aided Primary schools and Secondary schools;
- Private schools (both Primary and Secondary); and,
- Community schools, which include specialist institutions such as schools for Special Needs Education.

Table 5-7 presents the number of each of these schools within various Divisions of Kampala.

Table 5-7: Number of the various categories of schools per administrative division

Division	Pre-Primary Schools	Primary Schools	Secondary Schools	Tertiary School
Lubaga	201	273	83	13
Makindye	173	213	65	04

Division	Pre-Primary Schools	Primary Schools	Secondary Schools	Tertiary School
Kawempe	194	217	40	-
Central	37	50	27	08
Nakawa	115	119	33	-
Total	**720**	**872**	**248**	**25**

Source: OVC Service Provider Mapping Report, 2008

Table 5-8 shows that Kampala's main source of income is employment, trading in non-agricultural products and agricultural produce; and the lowest income from animal rearing and fishing. Kampala is the nation's business hub and has vibrant telecommunication, manufacturing, recreation, transport, construction and banking sectors.

Table 5-8: Kampala's Main Economic Activities

Categories	Percentage
Animal Rearing	0.1
Crop Farming	1.6
Fishing	1
Employment Income	64.3
Trading in Agricultural Produce	9.2
Trading in non-agricultural products	19.4
Others	4.4
Total	100

Source: OVC Service Provider Mapping Report, 2008

Markets in Kampala are strategically located both in the City Centre and the suburbs; supply the bulk of the population food, both fresh produce and durables, clothing and household products; provide employment to 5% or more of the active workforce. In many cases, road-side markets that either operate throughout the day or only in evenings can also be found. Majority of the people in the project area are engaged in formal employment as the main source of livelihood.

5.1.12 Physical Cultural Resources

Kampala has a number of historic buildings, many of them of cultural significance, which should be protected. These are generally concentrated in but not limited to:

- Old Kampala;
- The Historic Centre (the Kibuga);
- Makerere University;
- Old Colonial Suburbs;
- The City Centre;
- Historic schools, hospitals and missionary compounds.

Notable heritage sites in Kampala that may be directly or remotely associated with the proposed development are:

- Bulange building at Mengo
- Kabaka Mwanga's Lake

- Mengo Palace
- Kasubi Tombs
- Katereke prison
- Namugongo Martyrs' Shrine
- Nommo Gallery
- Uganda National Museum, Kampala
- Wamala tombs

Source: KCCA Updating Kampala Structure Plan and Upgrading the Kampala GIS Unit, September 2012

Figure 5-2: Examples of historic buildings in Kampala

The Uganda Museum: It's a National Museum and is the oldest in East Africa, established in 1908. It has a range of ethnographic collections about agriculture, hunting, war and religion. There are various huts from various tribes of Uganda. There are also archaeological and natural history displays, and a collection of interesting traditional musical instruments. The museum is found in the Kampala city suburb of Kamwokya. The Uganda Society Library is also found here in the main museum building and it contains a comprehensive collection of books not commonly found in the public domain.

Kasubi Tombs are steeped in Ganda cultural history. In 1882, Kabaka Mutesa relocated his palace to Nabugala hill and renamed it Kasubi Hill after his birth place some 50 km away, and when he died in 1884, Kasubi Hill was abandoned in accordance with Ganda custom upon the death of a King who was then buried there. Mwanga who succeeded him established a new capital at Mengo Hill but when he died in 1910 in a break from tradition, Kasubi rather than Mengo was the burial place of

Mwanga and after him more kings. The tombs of Daudi Chwa II who ruled from 1879 to 1939 and Edward Mutesa II who died in 1969 in exile in London and whose body was returned to Uganda in 1971 are at Kasubi. Constructed in the original palace of Mutesa, it contains several huts of Ganda traditional architecture built from poles, reed, thatch and bark. The tombs have an enviable collection of relics from a royal past such as artefacts which range from traditional music instruments, weapons, shields and spears. The Kasubi tombs are a UNESCO world heritage site and are found in central Uganda, in Kampala in a city suburb and are open to visitors.

Wamala Tomb found in central Kampala at Nansana is little known in comparison to Kasubi tombs and not as well tended but is an equally important place for culture. It is the resting place of Kabaka Mutesa I's father and Suuna his predecessor. The tomb is housed in an attractive, traditional, thatched and domed building. Displayed is an array of royal artefacts which include spears, shields, drums and other musical instruments.

Buildings of Buganda Kingdom: What is now Kampala city is part of Buganda, and in pre and post-colonial times when Kingdoms were supreme, it was the heart of the kingdom, and consequently a number of royal buildings and impressive administrative centres are to be found. Among these are the Kabaka's Palace in Bulange in Mengo, the Buganda Parliament located at the end of a ceremonial driveway-Kabakanjagala Road leading from the palace, and the Buganda Court of Justice, now the location of the Uganda's National Court. Of these, the Buganda Parliament is one of the most impressive colonial-era buildings in Uganda.

Religious Buildings: There are several prominent religious buildings of interest. Notable among these are the huge domed Roman Catholic Rubaga Cathedral on Rubaga Hill, the twin-towered Anglican Namirembe Cathedral on Namirembe Hill, the elaborate and enormous Hindu Temples in the city centre, the beautiful Baha'i Temple outside the city, Kibuli Mosque on Kibuli Hill and Gaddafi Mosque named after Libyan President Colonel Muhammar Gaddafi who funded its construction. All of these buildings are captivating but Baha'i Temple is distinct because it's the only one of its kind in the whole of Africa and consequently, the continent's religious home for all Baha'i faithfuls. It's located on Kikaaya Hill 6 km from Kampala City on Gayaza road.

Kabaka's Trail reveals the secret history of the Buganda people. Six sites make up the trail and all are around Kampala which has always been part of Buganda from time immemorial, and these include several tombs, a prison and a water fall.

Katereke Prison was constructed by Kabaka Kalema who ascended the Buganda throne controversially in 1888 after Kabaka Mwanga was forced into exile. It is part of the Kabaka's trail. Insecure, Kalema rounded up every potential person he imagined was a threat to his reign and sent them to Katereke. Royals and peasants alike were incarcerated. Among the unfortunates was Kiwewa who was an interim King and ruled briefly from the time of Mwanga's exile to Kalema's ascent to the throne. Together with his wives, two of Mwanga's infant sons and even Kalema's own brothers and sisters were killed at Katereke. These killings wrought his down fall and brutal death which was not only to avenge the deaths but was also to stop him for he was starved for seven days and shot in the head.

Namugongo Martyrs' Shrine was an execution site in pre-colonial Buganda and death was by hacking. Before incursions of foreigners, Buganda and other societies practiced African religion and steeped in myth, superstition, witchcraft and the supernatural. But with the coming of foreigners, other religions were introduced and the number of converts soon grew. The first foreigners were the Arabs who converted Mwanga to the new Islamic faith. Next came the Europeans of the Christian faith - Roman Catholics and Protestants, shortly after each other but also got new followers. Mwanga, zealous to protect his new faith, rounded up a number of his subjects - men and women, young and old, among whom were a good number of his pages, and marched them naked to Namugongo where he asked them to renounce their faith in exchange for clemency. However, for

the 26 (evenly distributed between protestant and catholic) who obstinately refused, the fate was a gruesome one, preceded by on-spot hacking and burning of Charles Lwanga the leader of the Catholics. The remaining ones were burnt later in the day, tightly bound and thrown into fire alive. The shrine was built in memory of these believers and yearly, Christians from all over the world make a pilgrimage to the site.

5.2 Project Area Specific Baseline

The Project area covers the divisions of Kawempe, Lubaga, Makindye and Nakawa within Kampala City. The environmental and socio-economic characteristics of the areas along the channel routes will be detailed in this section. In particular, land use, the drainage situation, solid waste management, hydrology and water quality, ecology, soil types, air quality, ambient noise and the socio-economic characteristics of the Project area are prepared.

5.2.1 Environmental Baseline

5.2.1.1 Drainage Situation/ Flood Prone Areas

By their very nature and function of conveying storm water through a given catchment, storm water drainage channels are constructed in the lower lying areas, majority of which are in the flood plains. The flooding problem along the channels is caused and exacerbated by developments in wetlands that would otherwise operate as floodplains to retain waters during storms.

5.2.1.1.1 Primary 2 - Lubigi

During the preparation of the 2003 KDMP, flood lines for each of the drainage systems within and around Kampala were derived for the 10 year discharge and the extent of flooding within the Lubigi drainage system is presented in Figure 5-4**.**

Figure 5-3: Lubigi Drainage System 10 year flood line generated in 2003 KDMP

Primary channel 2 traverses some of the worst flood-prone areas in Kampala City, such as Bwaise and Kawempe. The topography of the Primary 2 catchment area, with an illustration of the terrain profile is presented in *Map 5-3*.

Residents in many areas along the secondary channels reported flooding, with flood barriers built on houses or sandbags lined along the channel as evidence. Further evidence of flooding was deserted houses observed in some areas such as those shown in *Figure 5-4*, taken along Secondary 8 in

Mulago. Residents along Secondary 7 in Bwaise reported an incident of flood water drowning a resident in recent years.

Figure 5-4: Typical example of flood barrier constructed around a house

Figure 5-5: Typical example of flood barrier constructed outside a front door

Figure 5-6: Sandbags used as flood barriers along a section on Secondary 8

Figure 5-7: An example of deserted houses along Secondary 8

5.2.1.1.2 Primary 4 & 4A – Kansanga and Gaba

The 10 year flood line generated by the 2003 KDMP for the Kansanga and Gaba Drainage Systems is presented in Figure 5-8.

Figure 5-8: Kansanga and Gaba Drainage System 10 year flood line from 2003 KDMP

As within many of the other drainage systems, the housing and infrastructure development has created additional pressures on the natural drainage channels to cope with and such typical creative works within the drainage channels are illustrated in Figure 5-8 and described as follows:

- Residents in many areas along the primary and secondary channels reported flooding, with flood barriers built along the banks of the channels by local residents in an attempt to keep flood water out of their buildings and properties.
- In some areas, the amount of sedimentation within the channels is so great that the bed of the channels have risen over time to the point where the current base of the drainage channels is actually higher than the surrounding land which the channels are meant to drain.
- The extent of flooding has forced some occupants to vacate buildings which now sit idle and deserted. It is further evidence of the extent of flooding within these areas that with such a high demand for housing that these many deserted buildings remain unoccupied.
- Numerous crossings over the channels and the inadequacy of same are common throughout the area.

a) Typical example of buildings encroaching onto channels

b) Typical example of channel bed higher than surrounding land

c) Multiple crossings over channels

d) An example of deserted houses along Secondary 2

Figure 5-9: Illustration of flood prevention measures undertaken in Kansanga / Gaba

The topography of the catchment areas 4 and 4A, with illustrations of their terrain profile are presented in *Map 5-4* and *Map 5-5*, respectively.

5.2.1.1.3 Primary 6 - Kinawataka

The 10 year flood line generated by the 2003 KDMP for the Kinawataka Drainage Systems is presented in Figure 5-10.

Figure 5-10: Kinawataka Drainage System 10 year flood line from 2003 KDMP

The issues faced by local residents and the actions taken to avoid flooding to their homes within Kinawataka area are really no different to the other areas with the exception that the Kinawataka has a major industrial area present.

Flooding within the industrial area occurs on a regular basis and much of the flooding can be attributed to:

- Occupiers of the various industrial complexes taking matters into their own hands and:
  - building high solid boundary walls which have dual purposes, these being:
    - Legitimately act as a boundary wall fence offering good levels of security;
    - Form flood protection barriers which effectively prevent flood waters from entering their property and divert drainage flows away from the complex.
    - Where adjacent complexes have a drainage channel between their boundaries, boundary walls are constructed with little regard being given to the amount of land

allocated for drainage infrastructure between the boundary walls with the end result that there is no access for maintenance.
    - Encroaching into channel profile to place security grills / racks which trap debris in the channels
- Building industrial complexes such that the footprint of the complex covers the drainage channel and providing minimal infrastructure for drainage.
- Constructing of access crossings from roads into complexes over main drainage channels with little regard to provision of adequate through flow capacity within the culvert crossing.
    - Whilst the housing and infrastructure developments create problems, the industrial complex development has added a "scaled up version" of the many pressures placed on the natural drainage channels as illustrated in Figure 5-11.

a) Boundary walls constructed with minimal land for drainage.

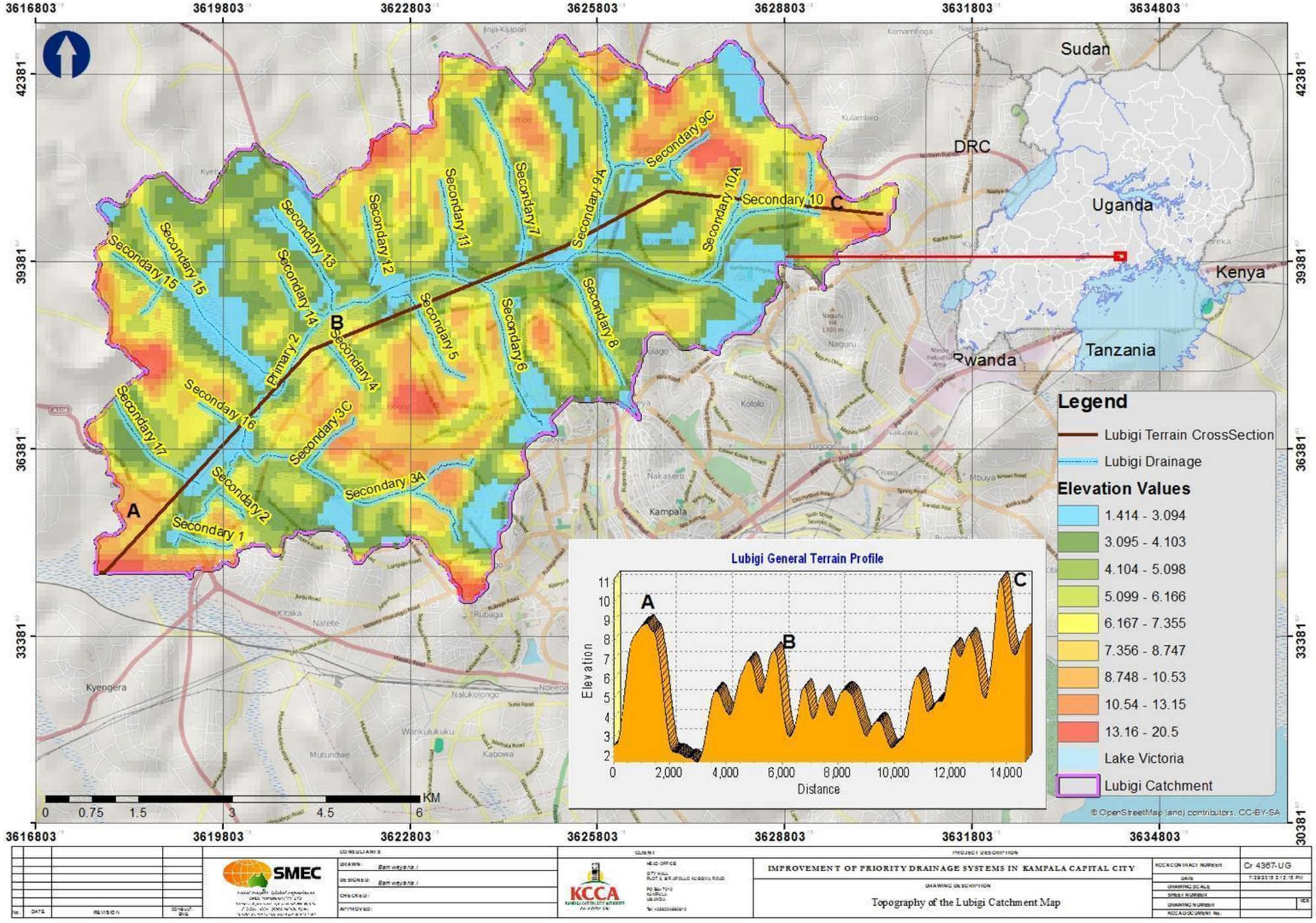
b) Outfall of drainage under an industrial complex

c) Small capacity culverts for access to industrial complexes

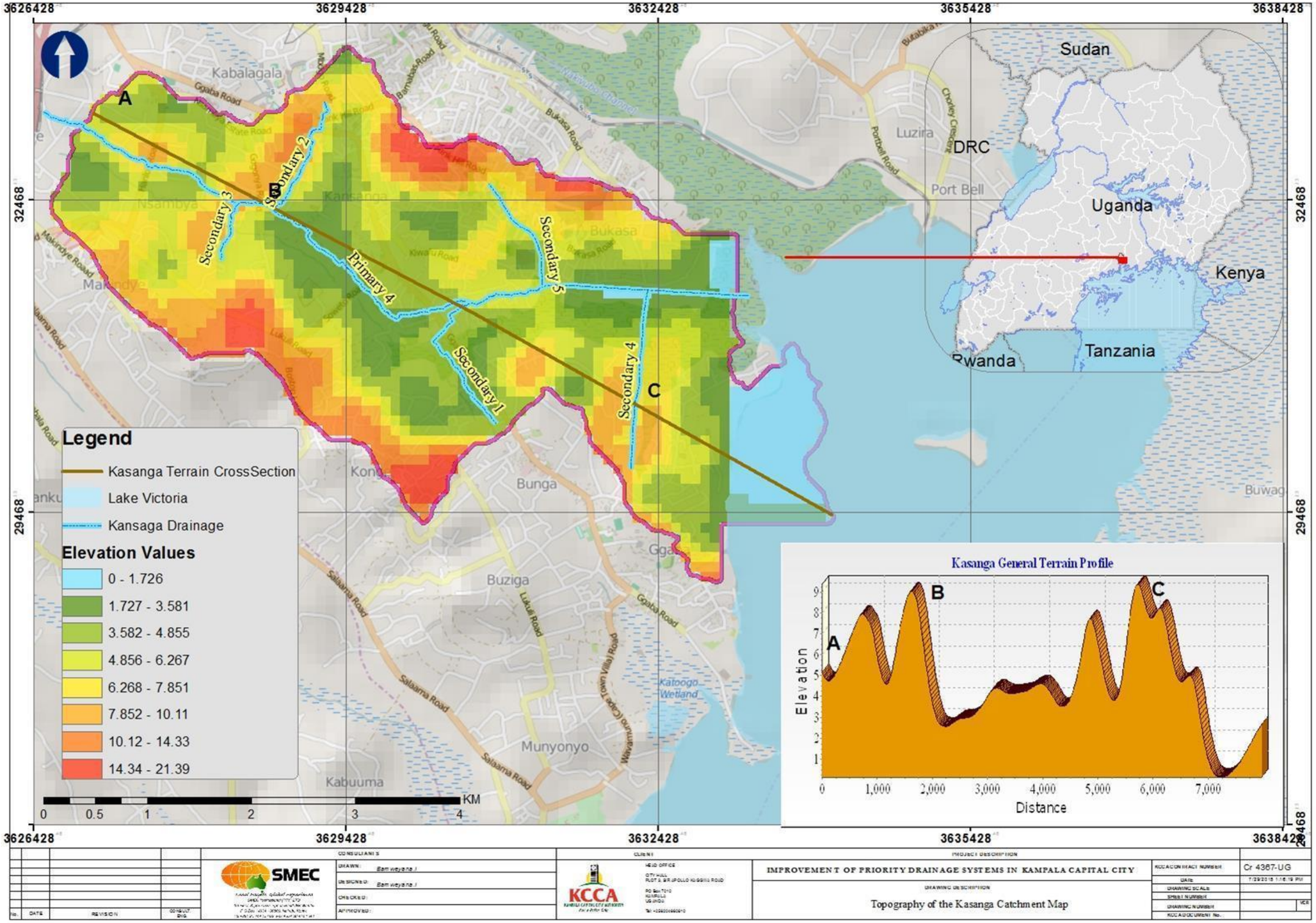
d) In-line security in channels at boundary walls

Figure 5-11: Illustration of flood prevention measures undertaken in Kinawataka

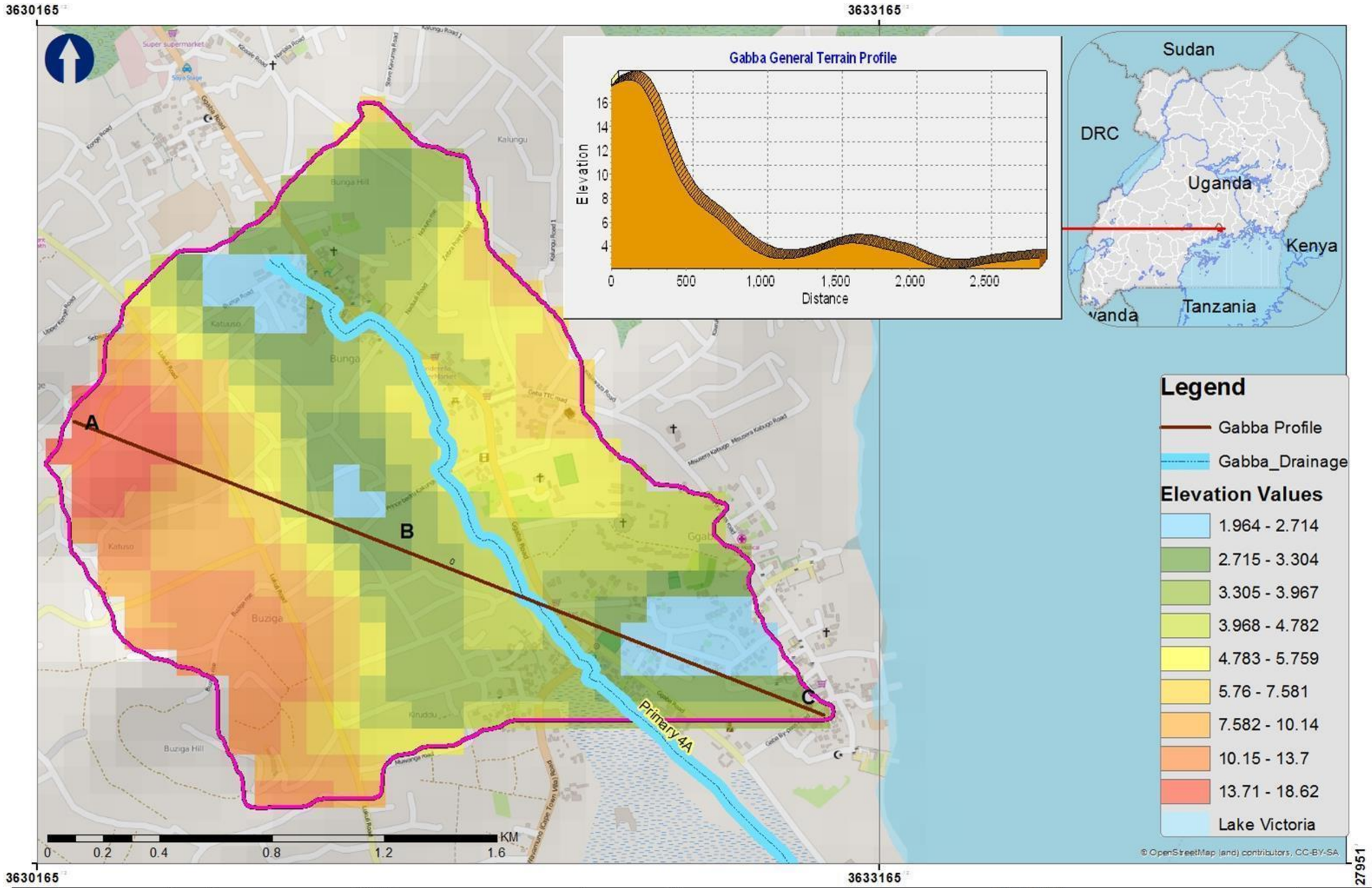
Map 5-6 shows the Primary 6 catchment topography, including an illustration of the terrain profile in areas where the primary cannel is located. The primary channel drains through low-lying areas. The slope and flow are in the east-west direction.



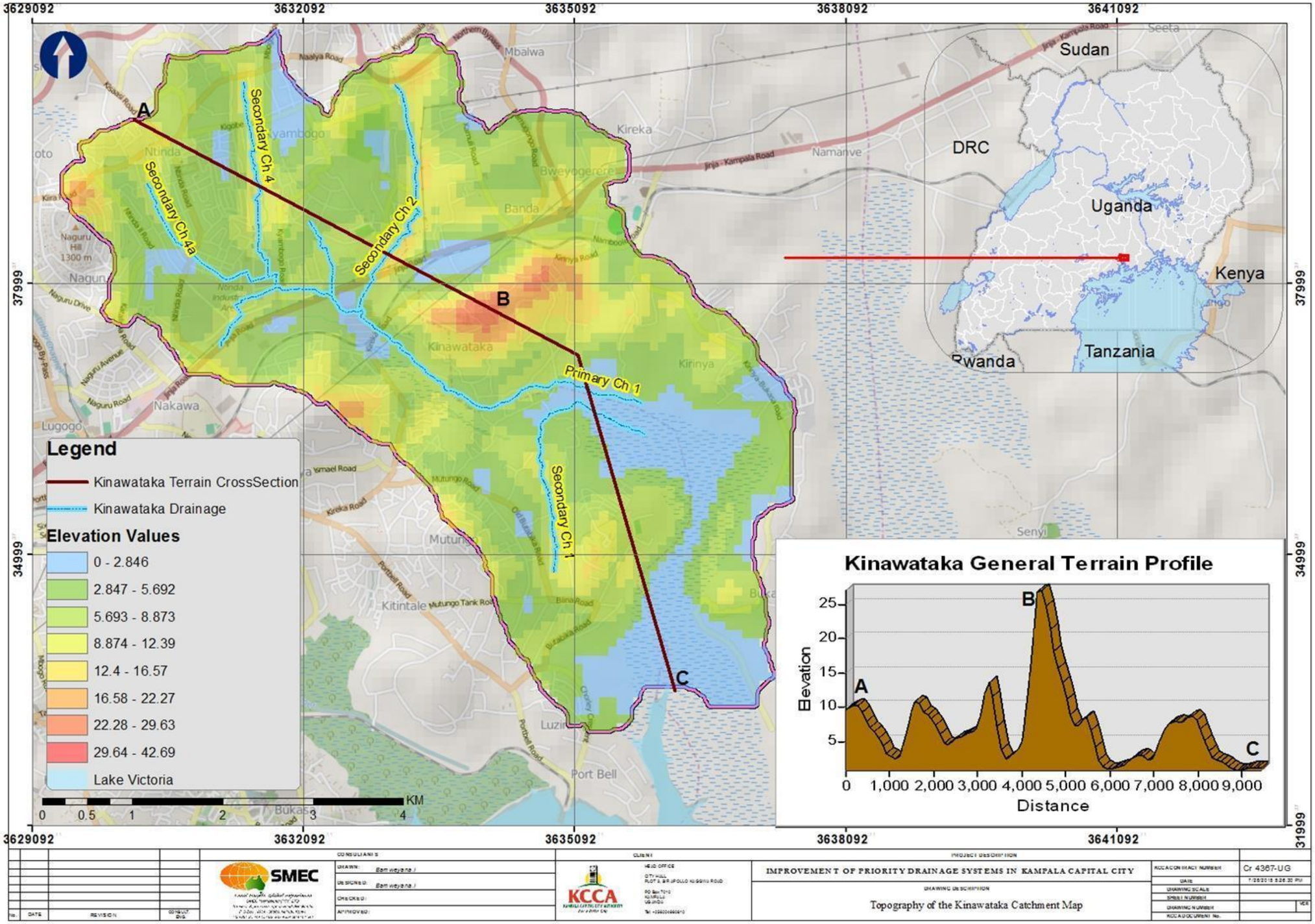
Map 5-3: Primary 2 Catchment Topography



Map 5-4: Primary Channel 4 Catchment Topography



Map 5-5: Primary 4A Catchment Topography



Map 5-6: Primary 6 Catchment Topography

5.2.1.2 Ecology – Flora and Fauna

Majority of the sections along the channels are of a built environment with only a few sections having natural vegetation. The drainage channels are drained through wetlands in the district occupying shallow valleys between the many hills before they discharge into the receiving water bodies. Wetlands thus form an important ecosystem offering hydrological functions as well as being a habitat to a variety of fauna. Some of the wetlands within the Project area include Kinawataka wetland (Kasokoso, Kireka, Mbuya), Kiwooya wetland (Kiwooya), Wamanlaye wetland (Kyambogo), Nsooba wetland (Kyebando Kisalosalo, Bahai Road), and the major wetlands of Lubigi, Kinawataka, Kansanga and Gaba.

5.2.1.2.1 Vegetation

A) Lubigi Catchment System

Observed vegetation and human activities

The description of vegetation cover in each of the survey plots within Lubigi drainage catchment, the major signs of disturbance and human activities are presented in Table 5-9. Human interference along the drainage catchment was evident mainly through agriculture as observed in a number of locations within the study area (*Figure 5-12*). The drainage catchment has significant land conversion, burning and harvesting of papyrus as well as infrastructure development (Entebbe Express high way, Northern Bypass, Industrial park and Lubigi Sewerage Treatment plant). Settlement and garbage disposal are evident along almost all the secondary drainage channels with no single channel with pristine habitat from Namungoona roundabout up to Bukoto roundabout. The catchment from Namungoona to Bulenga roundabout still retains some wetland plant communities although suffering human vandalism as described above.

Table 5-9: Vegetation and Human activities in the Lubigi drainage catchment

Coordinates	Altitude (ft.)	Vegetation	Disturbance signs
36 N 0445876 0034381	3745	Wetland dominated by Cyperus papyrus	Agriculture and Fire
36 N 0445856 0034324	3761	Contiguous community of grassland and wetland plants	Construction and Agriculture
36 N 0445803 0034223	3770	Wetland with sporadic gardens	Agriculture
36 N 0445776 0034115	3773	Wetland fringed by gardens	Agriculture
36 N 0446069 0034427	3804	Grassland due to wetland degradation	Construction activities
36 N 0446169 0034670	3796	Wetland	Construction activities
36 N 0446211 0034896	3789	Wetland	Agriculture and papyrus collection
36 N 0446764 0036818	3813	Wetland	Agriculture
36 N 0446882 0036909	3813	Wetland	Agriculture

Coordinates	Altitude (ft.)	Vegetation	Disturbance signs
36 N 0446998 0036873	3814	Wetland	Agriculture
36 N 0447127 0036801	3808	Wetland	Agriculture
36 N 0447245 0036766	3810	Wetland	Agriculture
36 N 0448296 0037901	3815	Wetland	Agriculture
36 N 0449129 0038275	3825	Wetland	Agriculture
36 N 0449150 0038406	3829	Wetland	Agriculture
36 N 0449253 0038451	3833	Wetland	Agriculture
36 N 0449351 0038484	3836	Fallow	Settlement and Small scale Eucalyptus plantation
36 N 0450238 0041453	3916	Small scale *Eucalyptus* plantation	Settlement and Small scale Eucalyptus plantation

A section of Lubigi wetland where cultivation is done

A section of Lubigi wetland where road construction is on-going

A burnt section of Lubigi wetland where papyrus is harvested

A section of Lubigi where papyrus is harvested.

Figure 5-12: Human activities observed in Lubigi catchment

Plant communities

The check list of all plant species encountered per plot in the drainage catchment is presented in Volume 2; Appendices (Table B1). A total of 63 plant species, majority of which are wetlands plants, were recorded during the survey. The weights generated by a particular plant were summed up to get the total abundance of that plant in a particular catchment. The results of this analysis are also presented in Table B1. This weighting revealed that among wetland plants, *Cyperus papyrus*, *Leearsia hexandra, Echinochloa pyramidalis* and *Typha capensis* have higher coverage along major channels and catchment areas. Presence of *Spermania ricinocarpa, Coix lacryma and penissetum poureum* in high abundance is indicative of wetland conversion at the catchment expanse.

Plant community structure

Lubigi drainage catchment had some individuals of *Phoenix reclinata* in tree layer whose heights were over 8 m. However, many plants in the shrub layer were between 1-5 m and those in the herbaceous and grass layers between 0.5-2 m. *Figure 5-13* shows that the vegetation of the Lubigi wetland system is of mostly low stature growth and mostly dominated by shrubs. Therefore, there would not be many woody (tree) species to be removed by the proposed project.

Figure 5-13: Range of heights for vegetation in Lubigi catchment

B) Kansanga - Gaba Catchment Systems

Vegetation and Human activities

Human interference along the drainage channels within the catchment was evident through small scale Eucalyptus and sugar cane plantations, settlement and garbage disposal. The plant community along the primary and secondary channels, together with the catchment was dominated by fallows and/or fields of cultivation. Table 5-10 highlights the major signs of disturbance and human activities along the drainage channel, in each of the survey plots for the Kansanga and Gaba catchment.

Table 5-10: Vegetation and Human activities in the Kansanga and Gaba Catchment systems

Coordinates	Altitude (ft.)	Vegetation	Disturbance signs
36 N 0453957 0032334	3778	Wetland dominated by grasses	Agriculture, garbage disposal and soapy water from washing bay
36 N 0455579 0032574	3789	Streamline vegetation	Settlement
36 N 0455645 0032567	3784	Streamline vegetation	Settlement
36 N 0455637 0032524	3786	Streamline vegetation	Settlement
36 N 0457000 0030952	3735	Sugarcane plantation	Small scale sugarcane plantation
36 N 0456995 0030844	3730	Small scale Eucalyptus plantation	Small scale sugarcane plantation
36 N 0457054 0030873	3734	Small scale Eucalyptus plantation	Agriculture and garbage disposal
36 N 0457184 0030840	3734	Small scale Eucalyptus plantation	Agriculture and garbage disposal

Coordinates	Altitude (ft.)	Vegetation	Disturbance signs
36 N 0457019 0030747	3740	Wetland	Agriculture and garbage disposal
36 N 0456890 0030842	3739	Wetland	Agriculture and garbage disposal
36 N 0458883 0030348	3739	Wetland	Settlement and garbage disposal
36 N 0458957 0030400	3742	Wetland	Settlement, construction and garbage disposal
36 N 0458985 0030482	3740	Wetland	Agriculture
36 N 0459020 0030519	3741	Wetland	Agriculture
36 N 0459683 0030672	3744	Wetland	Settlement
36 N 0459177 0027870	3746	Wetland	Settlement

Figure 5-17 illustrates the nature state of the wetlands in four different areas within the catchments.

State of Catchment at Gaba

State of Catchment at Gaba

Encroachment within Kansanga catchment	Wetland conversion to grassland within Kansanga catchment

Figure 5-14: Showing evidence of disturbance of flora within Kansanga-Gaba Catchment

Plant communities

The check list of all plant species encountered per plot in the Kansanga and Gaba catchments is presented in Volume 2; Appendices (Table B2). A total of 65 plant species, majority of which are wetlands plants, were recorded during the survey. The weights generated by a particular plant were summed up to get the total abundance of that plant in that particular catchment. The results of this analysis are also presented in Table B2. This weighting revealed that among wetland plants Cyperus papyrus, *Leearsia hexandra, Typha capensis, Ipomea cairica*, and *Phragmitis mauritianum* have higher coverage along major channels and catchment areas. The catchment has the largest number of Cyperaceae plants with minimal disturbance. Presence of grasses along drainage channels in high abundance is indicative of wetland degradation.

Plant community structure

Kansanga and Gaba drainage catchments had plants in all layers, and the catchment had plants with the highest stature compared with all the other study areas as shown in *Figure 5-15*.

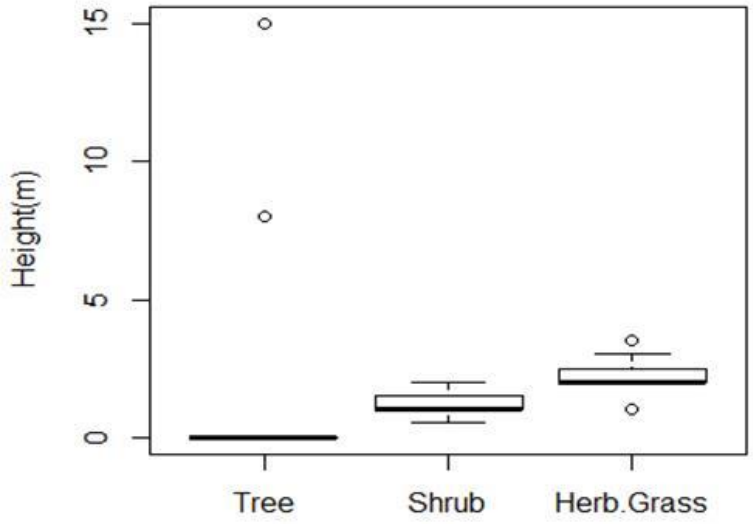


Figure 5-15: Range of heights of shrubs in Kansanga and Gaba catchments

The Plant community in the Gaba – Kansanga wetland system is generally of low stature for all the three growth forms investigated. This may be attributed to the pressures already exerted to the wetland by members of the local community.

C) Kinawataka Catchment System

Vegetation and Human activities

The description of the vegetation cover in each of the survey plots for Kinawataka drainage catchment, the major signs of disturbance and human activities along the drainage catchment are shown in Table 5-11 and Figure 5-16. Human interference along the catchment drainage was evident through small

scale agriculture, Settlement and garbage disposal. The plant community along the primary and secondary channels together with the catchment was dominated by fallows and/or fields of cultivation.

Table 5-11: Vegetation and Human activities in the Kinawataka drainage channel

Coordinates	**Altitude** (ft.)	**Vegetation**	**Disturbance signs**
36 N 0459254 0037024	3807	Post cultivation vegetation along stream	Cultivation, settlement and of dumping garbage
36 N 0459128 00370	3804	Wetland dominated by agricultural fields	Cultivation, settlement and of dumping garbage
36 N 0459121 0037162	3813	Fallow land with open grassland	Cultivation, settlement and of dumping garbage
36 N 0459185 0037186	3813	Fallow land with open grassland	Cultivation, settlement and of dumping garbage
36 N 0460052 0036196	3772	Abandoned fields of cultivation in a wetland	Cultivation, settlement and of dumping garbage
36 N 0460128 0036224	3767	Small scale Eucalyptus plantation	Cultivation, settlement and of dumping garbage
36 N 0460636 0036065	3779	Streamline vegetation dominated *Cyperus dives* and *Leearsia hexandra*	Grazing
36 N 0460546 0036091	3783	Garden of yams and matooke	Small scale agriculture
36 N 0460458 0036157	3783	Small scale Eucalyptus plantation	Small scale Eucalyptus plantation
36 N 0460421 0036181	3786	Open grassland community along stream	Agriculture and grazing
36 N 0460716 0036047	3782	Open grassland community along stream	Agriculture and grazing
36 N 0460764 0036058	3778	Post cultivation vegetation along stream	Agriculture
36 N 0461307 0036271	3776	Eucalyptus plantation	Brick making and small scale Eucalyptus plantation
36 N 0462231 0035916	3748	Eucalyptus plantation	Brick making and small scale Eucalyptus plantation
36 N 0462322 0035863	3737	Streamline vegetation fringed by gardens on either sides of the stream	Cultivation, settlement and of dumping garbage
36 N 0462494 0035801	3735	Wetland fringed by fields of cultivation	Agriculture

A disturbed Section of Kansanga wetland

A Permanently flood section of Gaba catchment area (with evidence of Human encroachment)

A semi-natural section of Kansanga catchment

A Rubbish dump area at Murchison bay area in Kansanga

Figure 5-16: Showing selected study areas within Kansanga-Gaba Catchment

Plant communities

The check list of all plant species encountered per plot in the drainage catchment is presented in Volume 2; Appendices Report (Table B3). A total of 65 plant species majority of which are wetlands plants were recorded during the survey. The weights generated by a particular plant were summed up to get the total abundance of that plant in that particular catchment drainage. This analysis is also presented in Table B3. This weighting revealed that among wetland plants Cyperus papyrus, *Leearsia hexandra, Echinochloa pyramidalis, Typha capensis, Phragmitis mauritianum* and *Spermania ricinocarpa* have higher coverage along major channels and catchment areas. Presence of *Spermania ricinocarpa* in high abundance is indicative of wetland conversion at the catchment expanse. Plants such as *Cynodon dactylon, Cleome sp, Ageratum conazoides,* and *Panicum maximum* are plants of disturbed habitats so their presence in high coverage and turn over indicates that the would be pristine habitats along the channels are now as fallows.

Plant community structure

In terms of vegetation structure Kinawataka catchment drainage had no plant in the tree layer, only one plant of about 5m high in the shrub layer while the height of plants in herbaceous and grass layer was between 0.5-1.2m as shown in Figure 5-17.

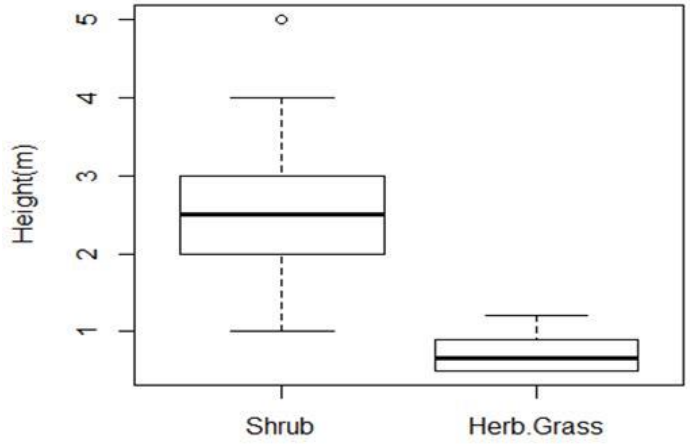


Figure 5-17: Range of heights for vegetation in Kinawataka catchment

Figure 5-18: Pennisetum purpureum along Secondary 01 in Lubigi

Figure 5-19: Sugar cane near the drainage channel in Lubigi

Figure 5-20: Cucurbita pepo (Pumpkin) climbing the drainage edge

Plant species of Conservation Concern in the Project area

None of the plant species encountered is of conservation concern according to IUCN. However, the areas to be upgraded occur in wetlands, which attract a lot of concern from local (NEMA 2010), regional and international environmental bodies.

Plant species such as *Pistia stratiotes and Nymphia lotus* known to survive on open water surface were rare which indicates that very few expanses of open water exist in the catchment probably due to receding water table or direct evaporation. Such plants will be conserved through protecting the wetland as a whole.

5.2.1.2.2 Fauna - Invertebrates

A) Lubigi Catchment System

Being in the urban center, most of the parts in Lubigi have semi-natural habitats and most of them were degraded habitats due to human settlement, pollution and many other human activities. There is a lot of habitat fragmentation even in the few remaining semi natural habitats. In many parts of Lubigi there is a lot of papyrus harvesting and farming activities and this has accelerated the degradation of this catchment area.

Butterfly and Dragon fly fauna

A total number of fourteen (14) butterfly species with from 46 individuals of butterflies were identified; and two (02) species of dragon flies from twelve (12) individuals were identified from Lubigi drainage catchment area (Table 5-12).

Table 5-12: Butterfly and dragonfly species diversity from Lubigi drainage catchment area

Butterflies	Dragon flies
Mylothrais rubricosta	*Palpopleura lucia*
Junonia tera	*Trithemis arteriosa*
Pontia terea	
Acraea ancerata	
Acraea quirinalis	
Amauris sp	
Asterop sp	
Euphaedra eleus	
Junonia oinone	
Bicyclus vulgaris	
Junonia sophia	
Charaxes fluvescens	
Hypolimnas dinarcha	
Junonia choremene	

Dragon flies and butterfly species of Conservation Concern within Lubigi catchment

There were fewer species of dragon flies than butterfly species. The generally lower number of species may be explained by the increased conversion of wetland habit. All the identified species of dragon flies and butterflies from Lubigi, are wide spread species and they are of Least conservation concern. No species considered to be a threatened species was recorded in the area.

A full list of the butterfly and dragon fly species against their IUCN Conservation status is presented in volume 2; Appendices report (Table B4 and B5).

B) Kansanga - Gaba Catchment Systems

Most of the parts in Kansanga-Gaba had semi-natural habitats and most of them were degraded habitats due to human settlement, pollution and many other human activities. There is a lot of habitat fragmentation even in the few remaining semi-natural habitats.

Butterfly and Dragon fly fauna

A total number of 19 butterfly species with a total number of 57 individuals of butterflies were identified; and two (02) species of dragon flies with thirteen (13) individuals were identified from Kansanga- Gaba drainage catchment area (Table 5-13).

Table 5-13: The butterfly and dragonfly species diversity from Kansanga-Gaba drainage catchment area

Butterflies	Dragon flies
Junonia oenone	*Psuedagrion hageni*
Junonia sophia	*Orthetrum angustiventre*

Butterflies	Dragon flies
Belenois creona	
Danaus chrysippus	
Amauris sp	
Bicyclus jefferyi	
Euphaedra elus	
Acraea quirinalis	
Acraea ancedana	
Dixeia pigia	
Pseudoacraea sp	
Junonia terea	
Bicyclus vulgaris	
Bicyclus mesogena	
Mylothrais rubricosta	
Bicyclus bouaea	
Junonia choremene	
Hypolimnas dinarcha	
phalanta eurytis	

Dragon flies and butterfly species of Conservation Concern within Kansanga and Gaba catchments

From Table B6 in volume 2; appendices report, only two species *Junonia oenone* and *Bicyclus jefferyi*, were listed as of 'least concern' according to the IUCN species conservation status. The rest of the butterfly species were not listed on the IUCN species list. All the species of butterflies identified are wide spread species.

Both species of dragon flies identified are of least concern according to the IUCN species conservation status (Table B7 in volume 2; Appendices report).

C) Kinawataka Catchment System

Being in the urban center, most of the parts in Kinawataka had semi-natural habitats and most of them were degraded habitats due to human settlement, pollution and many other human activities. There is a lot of habitat fragmentation even in the few remaining semi-natural habitats. The few remaining semi-natural habitat fragments of Kinawataka catchment area are being encroached on by members of the local community for cultivation and settlement.

Butterfly and Dragon fly fauna

A total number of ten (10) butterfly species with a total number of 49 individuals of butterflies were identified; and two (02) species of dragon flies with 20 individuals were identified from Kinawataka drainage catchment area (Table 5-14).

Table 5-14: The butterfly and dragonfly species diversity from Kinawataka drainage catchment area

Butterflies	DRAGON Flies
Euphaeadra eleus	*Crocothemis erythraea*
Pontia helice	*Palpopleura lucia*
Acraea ancedana	

Butterflies	DRAGON Flies
Acraea ancerata	
Bicyclus mesogena	
Bicyclus ena	
Bicyclus vulgaris	
Pseudoacraea sp	
Bicyclus bouaea	
Danaus chrysippus	

A section of the drainage channel in Kinawataka

A drainage channel in Kinawataka catchment area

A section of Kinawataka wetland being cultivated and planted with eucalyptus

A heap of rubbish in Kinawataka, near a water channel

Figure 5-21: Sections of the study area in Kinawataka catchment

Dragon flies and butterfly species of Conservation Concern within Kinawataka catchment

Table B8 in volume 2; Appendices report shows that the entire butterfly species encountered in the Kinawataka catchment is not listed on the IUCN species conservation list. All the species of butterflies identified are wide spread species.

All the dragon flies species encountered are of least concern according to the IUCN species conservation status (Table B9 in volume 2; Appendices report).

Conclusion

As Speight *et al* (2008) concluded that habitats that are more diverse in terms of greater plant species richness, should exhibit greater insect species richness as a consequence; the twenty four (24) species of butterflies found during this survey are consistent with the relative plant species diversity in these catchment areas. Due to the disturbed nature of the habitats in Kinawataka drainage catchment area, the butterfly and dragon flies' species diversity is relatively low as compared to a would-be pristine nature of the habitats. Therefore the proposed development of improving the drainage system in these catchments is likely to have minimal impact on the diversity and distribution of the butterflies through interference with the little remaining semi-natural habitats.

5.2.1.2.3 Fauna - Terrestrial Vertebrates

A) Lubigi Catchment System

Most of the drainage channel upstream is either in settlements or marshy habitats while the primary channel eventually opens into an extensive papyrus swamp. A full list of the amphibians and reptiles encountered during the survey is provided in volume 2; Appendices report (Tables B10 and B11).

Amphibians

A total of 14 individuals of amphibians representing eight (08) species and seven (07) genera that is *Afrixalus, Amietophrynus, Xenopus, Ptychadena, Phrynobatrachus, Hyperolius* and *Haplobatrachus* were recorded as listed in Table B10. Five (05) individuals of *Haplobatrachus occipitalis* were recorded representing the most abundant species at 36%.

Reptiles

Eight (08) species of reptiles from six (06) genera were recorded; some were only indicated as present (P) (Table B11) because they were only reported by locals but never encountered in the surveys. None of the species was dominant or abundant; all species were recorded as one or two individuals but reptiles in the genus *Phylothamnus* represented the most widespread individual because it was reported by locals in all areas. Figure 5-22 shows one of the species of amphibians encountered during the area survey.

Figure 5-22: P. mascareniensis recorded along Lubigi channel in Busega at 445824E, 34174N

Herpetile species of conservation concern within the project area in Lubigi catchment

None of the amphibian or reptilian species encountered represented any species of conservation concern, because all species recorded are widely distributed in other parts of the country. A full list of the amphibian and fauna species encountered during the survey, with their conservation status is provided in Tables B10 and B11 in volume 2; Appendices report.

B) Kansanga-Gaba Catchment Systems

Most of the secondary channels upstream are either in settlements or marshy habitats while the primary channel eventually opens into an extensive papyrus swamp in Kawuku, adjacent to Lake Victoria.

Amphibians

Along Kansanga drainage channel, a total of 45 individuals of amphibians representing 11 species and eight genera that is *Afrixalus, Amietophrynus, Xenopus, Kasina Ptychadena, Phrynobatrachus, Hyperolius* and *Haplobatrachus* were recorded. 8 individuals of *Haplobatrachus occipitalis* were recorded representing the most abundant species 18%. Along Gaba Primary channel, twelve (12) amphibians were recorded representing nine (09) species and seven (07) genera as shown volume 2; Appendices report (Tables B12 and B13).

Reptiles

11 species of reptiles from 9 genera i.e. *Mabuya, Acanthocercus, Hemidactylus, Phylothamnus, Leptotyphlops, Naja, Psamophis, Bitis* and *Drysdalia*; were recorded along Kansanga drainage channel; along Gaba drainage channel 6 species from 6 genera were recorded. Some species were only indicated as present (P) in Table B19 because they were only reported by locals but never encountered in the surveys. None of the species was dominant or abundant; all species were recorded as one or two individuals (Table B19) but reptiles in the genus *Phylothamnus* represented the most widespread individual because it was reported by locals in all areas.

A full list of the amphibians and reptiles encountered during the survey in this study area is provided in volume 2; Appendices report (Tables B12 and B13). *Figure 5-23* shows some of the species encountered during the area survey.

Drysdalia coronoides cf recorded near Kawuku in settlement area next to the swamp at 459002E, 30514N

Xenopus victorianus recorded along the Gaba drainage channel at 459149E, 27807N

Figure 5-23: Some of the reptiles and amphibians within the Kansanga-Gaba catchment

Herpetile species of conservation concern within the project area in Kansanga-Gaba catchments

None of the amphibian or reptilian species represented any species of conservation concern, because all species recorded are widely distributed in other parts of the country. A full list of the amphibian and fauna species encountered during the survey, with their conservation status is provided in Tables B12 and B13 in volume 2; Appendices report.

C) Kinawataka Catchment System

Most of the drainage channel line upstream is either in settlements or marshy habitats while the primary channel eventually opens into an extensive papyrus swamp in Kanan village.

Amphibians

A total of 38 individuals of amphibians representing 11 species and eight (08) genera that is *Afrixalus, Amietophrynus, Xenopus, Kasina Ptychadena, Phrynobatrachus, Hyperolius and Haplobatrachus* were recorded as listed in volume 2; Appendices report(Tables B14). Eight (08) individuals of *Haplobatrachus occipitalis* were recorded representing the most abundant species 21%.

Reptiles

Eight (08) species of reptiles from seven genera were recorded; some were only indicated as present (P) in volume 2; Appendices report(Tables B15) because they were only reported by locals but never encountered in the surveys. None of the species was dominant or abundant; all species were recorded as one or two individuals but reptiles in the genus *Phylothamnus* represented the most widespread individual because it was reported by locals in all areas. Figure 5-25 shows one of the amphibian species encountered in the Kinawataka area.

Figure 5-24: Phrynobatrachus natalensis recorded along Kinawataka drainage channel at (460485E, 36135N)

Herpitile species of conservation concern within the project area in Kinawataka catchment

None of the amphibian or reptilian species represented any species of conservation concern, because all species recorded are widely distributed in other parts of the country. A full list of the amphibian and fauna species encountered during the survey, with their conservation status is provided in Tables B14 and B15 in volume 2; Appendices report.

Conclusion

Most of the impacts will be due to vegetation clearance, road kills and harassment of the reptiles. Any reduction in the spatial extent of the existing wetlands contributes to reduced ecosystems services and habitat for the identified range of bird species and wetlands fauna. However no threatened species were observed in these biomes.

5.2.1.2.4 Fauna – Birds

A) Lubigi Catchment System

208 bird individuals were recorded in Lubigi representing 35 species including one (01) Endangered (E) species the Grey-crowned Crane (IUCN 2013), one (01) Near Threatened (NT) Papyrus gonolek (IUCN 2013), three (03) Regionally Near Threatened (R-NT) and one (01) Regionally Restricted Range (R-RR) (Birdlife (2011)). Marabou stork was the most abundant at 18% followed by little egret at 13%.

Figure 5-25 shows a long toed plover trying to conceal and protect her chicks in an open cleared marsh within the Lubigi catchment. The interruption of situation presented in this figure can be minimized by first inspecting the wetland to identify any breeding sites, plan to avoid them, or minimize vegetation clearance in such areas. Figure 5-26 shows a number of bird species encountered within the study area.

A full list of the bird species encountered during the survey, with their conservation status is provided in Table B16 in Volume 2; Appendices

Figure 5-25: Long toed plover trying to conceal and protect her chicks in an open cleared marsh. Photo taken in Lubigi wetland at (445837E, 0034376N)

A pan in Lubigi wetland with a congregation of a variety of water birds at (445802E, 34195N).

Grey Heron standing in a previously burnt Papyrus marsh in Lubigi at (445837E, 34376N).

Figure 5-26: A variety of birds in the Lubigi Catchment

Bird Species of conservation concern within the project area in Lubigi

Among the 35 bird species recorded, two (2) are of global conservation significance and three (3) listed by Birdlife (2011) as of regional conservation significance (Table 5-15). Most of the other birds recorded in the area are widely distributed and are listed as LC in the IUCN red-list (2013).

Table 5-15: Bird Species of Conservation Importance along the Lubigi drainage channel

Bird Species	Habitat character	Conservation status
African Marsh Harrier	W	R-NT
Grey Heron	W	R-NT
Papyrus Gonolek	W	NT
Grey-crowned Crane	W	E
Grey-capped Warbler	W	R-RR

i) **Papyrus gonolek**

The species is listed as 'NT' because it is estimated to be in moderately rapid population decline owing to the ongoing conversion and degradation of its wetland habitats.

The species has highly specialized habitat requirements which makes it susceptible to threats such as burning of wetland vegetation and overexploitation of wetlands.

The Papyrus Gonolek is typically a bird of dense papyrus swamp and will only likely survive in dense papyrus stands that are larger than a few hectares. Unlike Cranes that could use long distance flights to disperse to different suitable swamp habitats, this species will be dependent on connectivity between papyrus swamps for dispersal.

ii) **Grey-crowned Crane**

This bird is part of the national emblem and is listed as endangered (Birdlife International, 2013) because threats such as habitat loss and the illegal removal of bird eggs from the wild has caused very rapid declines in numbers during the last three generations (45 years). The species is not migratory although it may make variable local and seasonal movements depending on the abundance and distribution of food, rainfall and nest sites (Birdlife International, 2013). The species inhabits wetlands such as marshes, pans and dams with tall emergent vegetation (Birdlife International 2013). It however shows preference for short to medium height open grasslands adjacent to wetlands with in which they forage (Birdlife International, 2013).

The Grey-crowned Crane is a bird typical of wetland areas which will, however, avoid areas of dense Papyrus preferring swamps with sedges. They construct their nests and raise their chicks in such swamps until they are ready to fly. They may also be seen and/or associated with other kinds of swamps where they forage. Therefore, even when the critical swamp types for nesting are not present, Cranes maybe recorded in areas which represent their wide ranging area and not particularly areas very critical for their survival.

B) Kansanga-Gaba Catchment Systems

141 bird individuals were recorded in Kansanga representing 38 species two (02) of which are of regional conservation importance i.e. Gray capped warbler regionally restricted range and Purple heron regionally near threatened Birdlife (2011); 44 in Gaba representing 15 species. Black kite was the most abundant 11% followed by Little egret 6%. A full list of the bird species encountered during the survey, with their conservation status is provided in Table B17 in Volume 2; Appendices.

Yellow-throated Long Claw recorded Nanganda Kansanga drainage channel at (456924E, 30796N).

Black Kite perched on a tree in Kawuku along the Kansanga-Gaba drainage channel at 459002E, 30514N

Figure 5-27: Some birds identified within the study area in Kansanga and Gaba

Bird species of conservation concern within the project area in Kansanga-Gaba Catchment

Two (02) species of regional importance Gray-capped Warbler regionally restricted range and Purple Heron regionally near threatened Birdlife (2011) were recorded. All the other bird species reported

have no known conservation concern both globally and regionally because they are widely distributed in most wetland areas of the country.

C) Kinawataka Catchment System

214 bird individuals were recorded in Kinawataka representing 38 species. Black kite and Little egret were the most abundant at 9% followed closely by Hadada ibis and Marabou stork at 7% and 6% respectively. A full list of the bird species encountered during the survey, with their conservation status is provided in Table B18 in Volume 2; Appendices. *Figure 5-28* shows some of the bird species encountered during the area survey.

Cattle egrets parched on a tree adjacent to the papyrus swamp in Kinawataka wetland (459330E, 37257N).

Reclaimed Swamp area along the Kinawataka swamp in Kasokoso at (460485E, 36135N).

Figure 5-28: Study area in Kinawataka

Bird species of conservation concern within the project area in Kinawataka catchment

None of the bird species reported is of conservation concern nationally, regionally and globally because all species recorded are widely distributed in most wetland areas of the country.

Conclusion

Altogether in the different channel systems investigated, a good diversity of birds was recorded with a few species either listed on the global IUCN or on the regional East African list of birds to watch. In all cases there was no evidence of considerable population concentrations of either IUCN or regional listed species named in Section 5.2.1.2.4(A – C) in any of the project areas.

Whereas the Grey Crowned Crane, an Endangered (IUCN 2016), was recorded in the Lubigi wetland area, there was no record of breeding activity or presence of recent fledglings (these would have different colored plumage than the adults) for this species in Lubigi or Kansanga-Gaba catchments. The same is true for all the other species listed in Table 5-15. Of the Grey Crowned Crane, Carswell et al. (2005) noted the species was widespread and until recently was often abundant, except in Northern Uganda where the Black Crowned Crane replaces it. Quoting Pomeroy (1980), these authors showed that numbers of cranes in Uganda were about 35,000 birds, and that in the Kampala area there were seasonal movements of the species, with flocks of up to 200 from late December to early April, notably in February, and again from June to August. In these surveys conducted in March, only 04 Cranes were

recorded at the sewage treatment plant in Lubigi in a period when we could expect large numbers. According to Carswell et al (2005) the Cranes are seen in a variety of habitats, including grassland and cultivation (both large- and small-scale) where they damage young crops. They adapt well to human modified and created habitats and will therefore be observed to range in many places. This emphasizes the fact that the species ranges widely even outside prime breeding sites; for which reason this record of these species should not be surprising.

It is important to also note that any reduction in the spatial extent of the existing wetlands contributes to reduced ecosystems services and habitat for biodiversity in the wetland systems.

5.2.1.3 Soil Types and Slope

5.2.1.3.1 Soil Type

Consistent with the general soil type within Kampala district (Section 5.1.6), the soil types within the Project area are mainly ferralitic as shown in Figure 5-29 to Figure 5-32. Ferralitic soils are characterised by a red colour. The other prominent soil type in the Project area is the gleysols, which are typical of wetlands. Gleysols are generally soils with clear signs of excess wetness. These are typically common along Lubigi primary as well as the downstream sections of Kansanga and Kinawataka primary channels towards the outflow to Lake Victoria (Figure 5-29 to Figure 5-32).

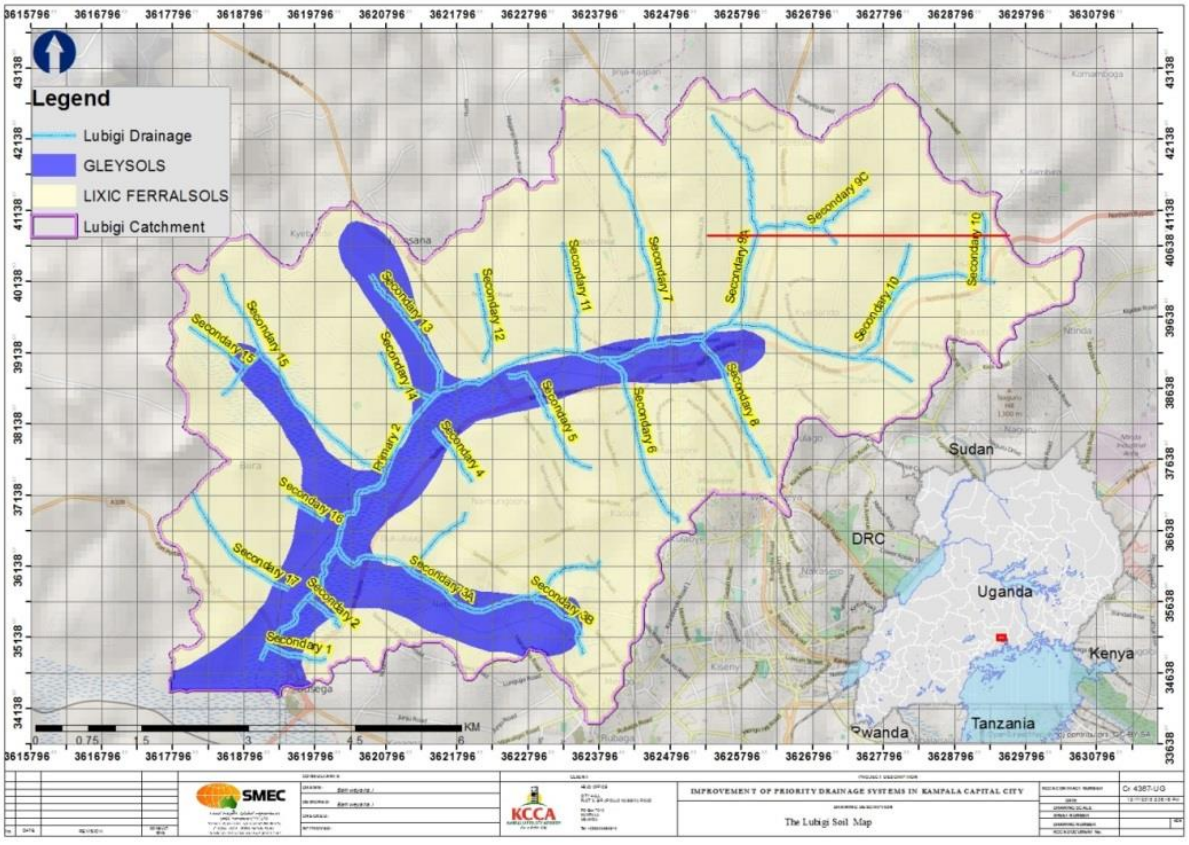


Figure 5-29: Soil types in Lubigi Catchment

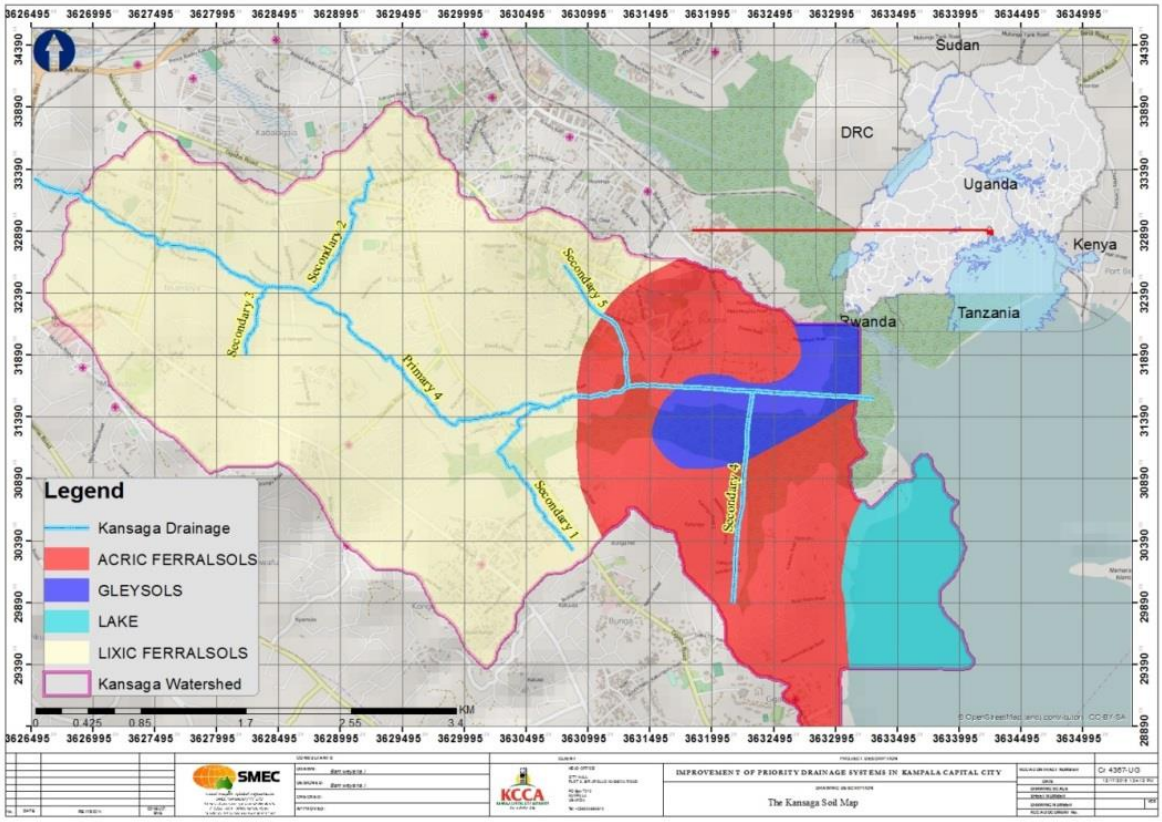


Figure 5-30: Soil types in Kansanga catchment

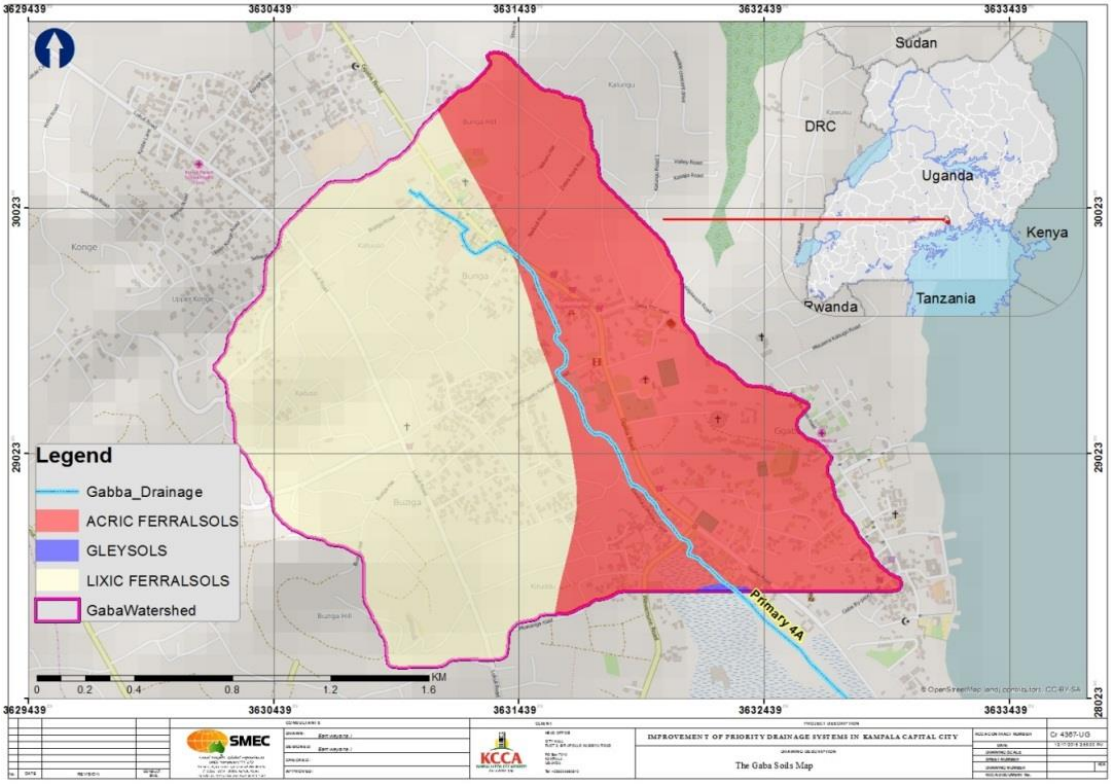


Figure 5-31: Soil types in Gaba catchment

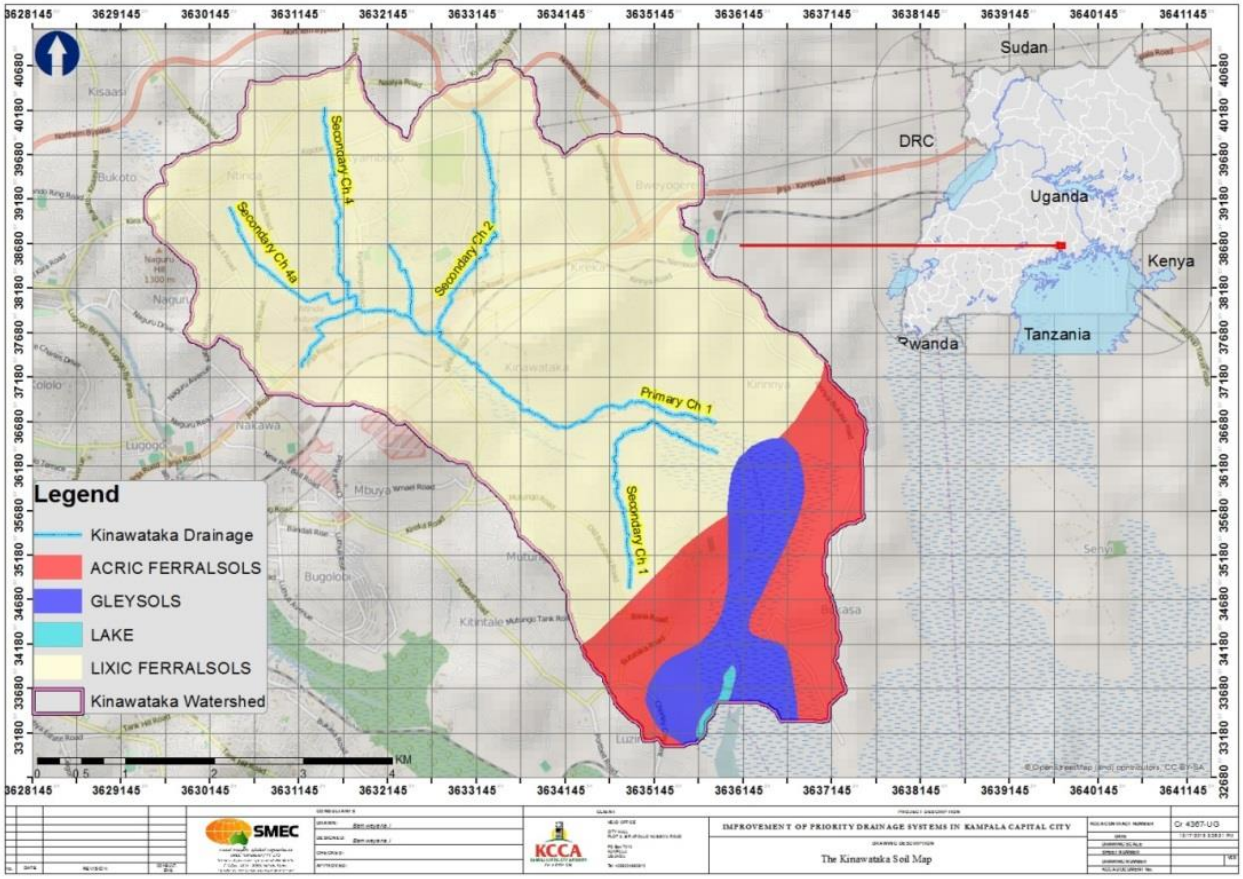


Figure 5-32: Soil types in Kinawataka catchment

5.2.1.3.2 Slope

As is characteristic of drainage channels, the channels within this Project are located in low-lying areas with a generally low slope of 0 – 4 %. Table 5-16 provides a summary of the description of different ranges of slope.

The slope within the catchments generally increases with increasing distance away from the channels. This is true for both the Primary and Secondary channels, although some secondary channels have their start points in the upper reaches within the 4 – 12% slope range as shown in Figure 5-33 to Figure 5-36.

Table 5-16: Description of slope

% Slope	Description
0 - 5	Level to very gentle slopes
>5 - 9	Gentle slopes
> 9 - 15	Moderate slopes
>15 - 30	Steep slopes
> 30	Very steep slopes

Source: Soil Management Guide, Agriculture, Food and Rural Development, Manitoba

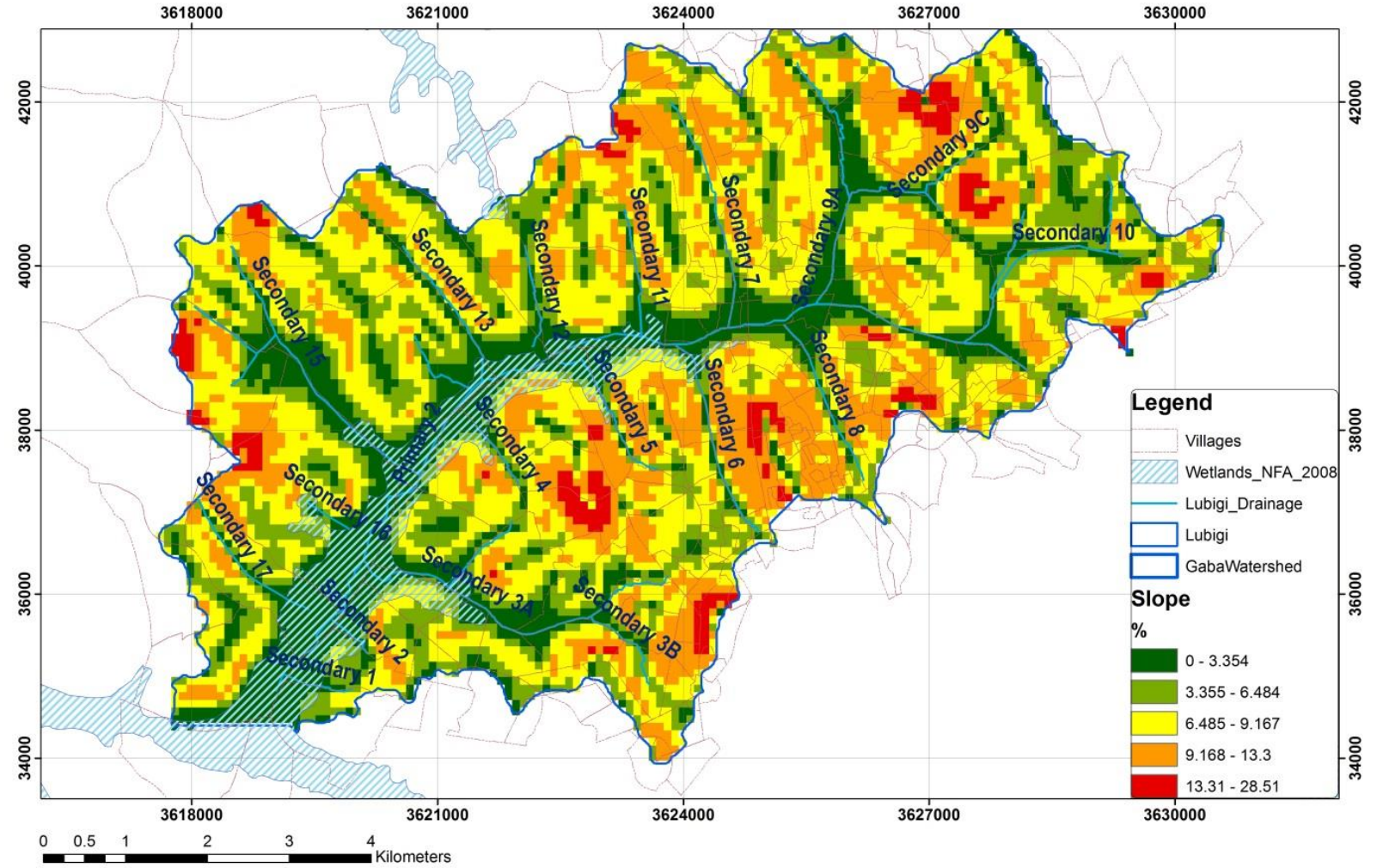
The significance of the slope variation within the Project area is because of the direct relationship between slope and soil erosion. The degree of soil erosion is generally affected by slope length and steepness, and this is presented as % slope in Figure 5-33 to Figure 5-36.

The slope ranges for the Lubigi catchment range between 0% and 3%, especially along the primary channel secondary channels. A few areas in the upper reaches of the secondary channels are within the slope ranges of 3% – 6% (Figure 5-33).

The slope ranges within Kansanga catchment range between 0% and 4%, especially along the primary channel and lower reaches of the secondary channels. The few of the upper reaches of the secondary channels 2 and 3 have slopes as high as 12% (Figure 5-34).

The slope ranges within Gaba catchment are within the range of 0% and 4.5% (Figure 5-35).

The slope ranges within Kinawataka catchment are between 0% and 4%, especially along the primary channel and lower reaches of the secondary channels. The higher slope ranges of 4% to 29% are found within the upper reaches of the secondary channels such as Kireka, Kasokoso, Kago and Naguru (Figure 5-36).



CONSULTANTS: SMEC Local People. Global Experience	DRAWN: Joseph Kyagulanyi	CLIENT: KCCA Kampala Capital City Authority	PROJECT DESCRIPTION: IMPROVEMENT OF PRIORITY DRAINAGE SYSTEMS IN KAMPALA CAPITAL CITY
	DESIGNED: Joseph Kyagulanyi		DRAWING DESCRIPTION
	CHECKED:		KCCA CONTRACT NUMBER: Cr 4367-UG
	APPROVED:		DATE / DRAWING SCALE / SHEET NUMBER / DRAWING NUMBER / KCCA DOCUMENT No.

Figure 5-33: Slope of Lubigi catchment

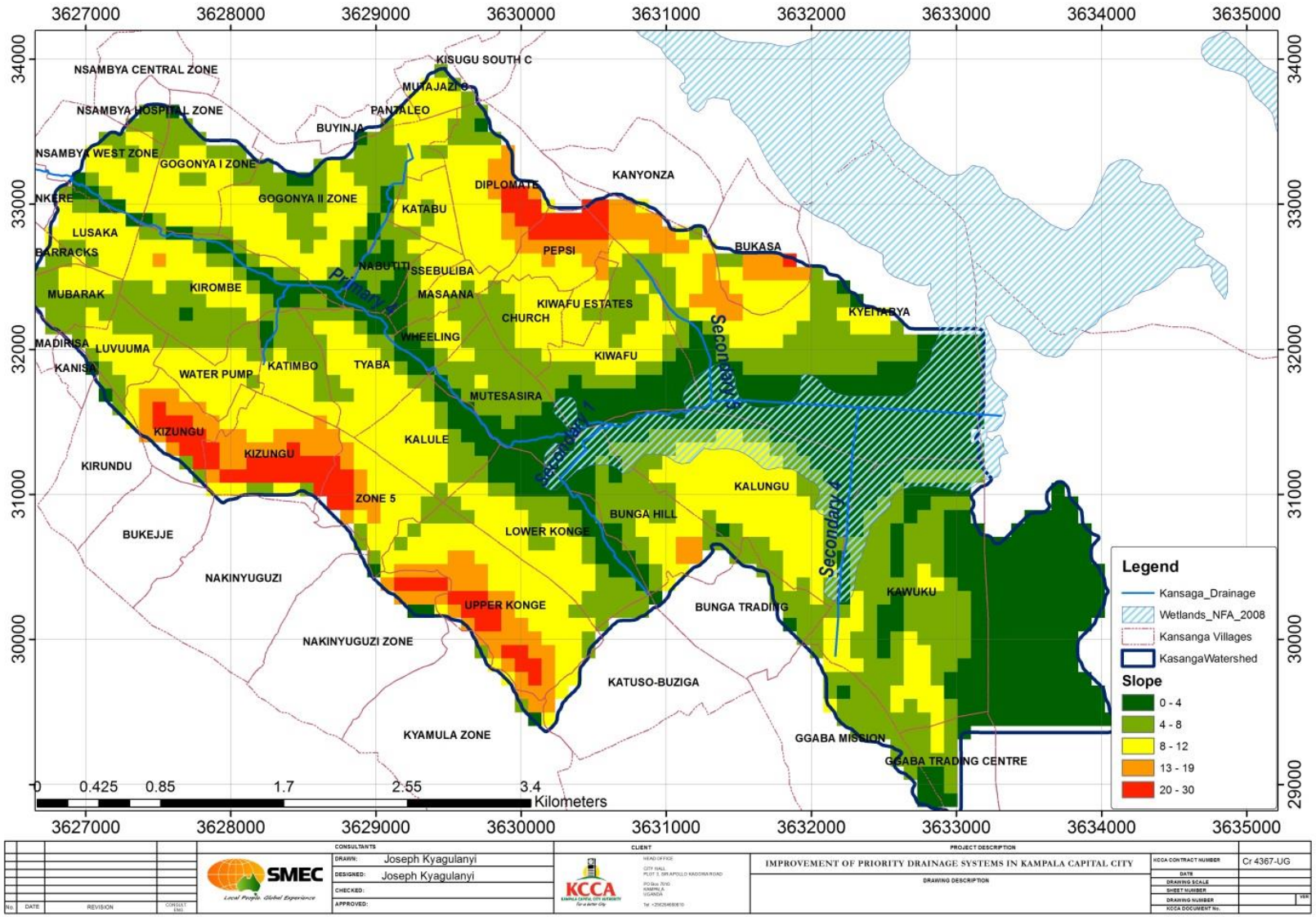
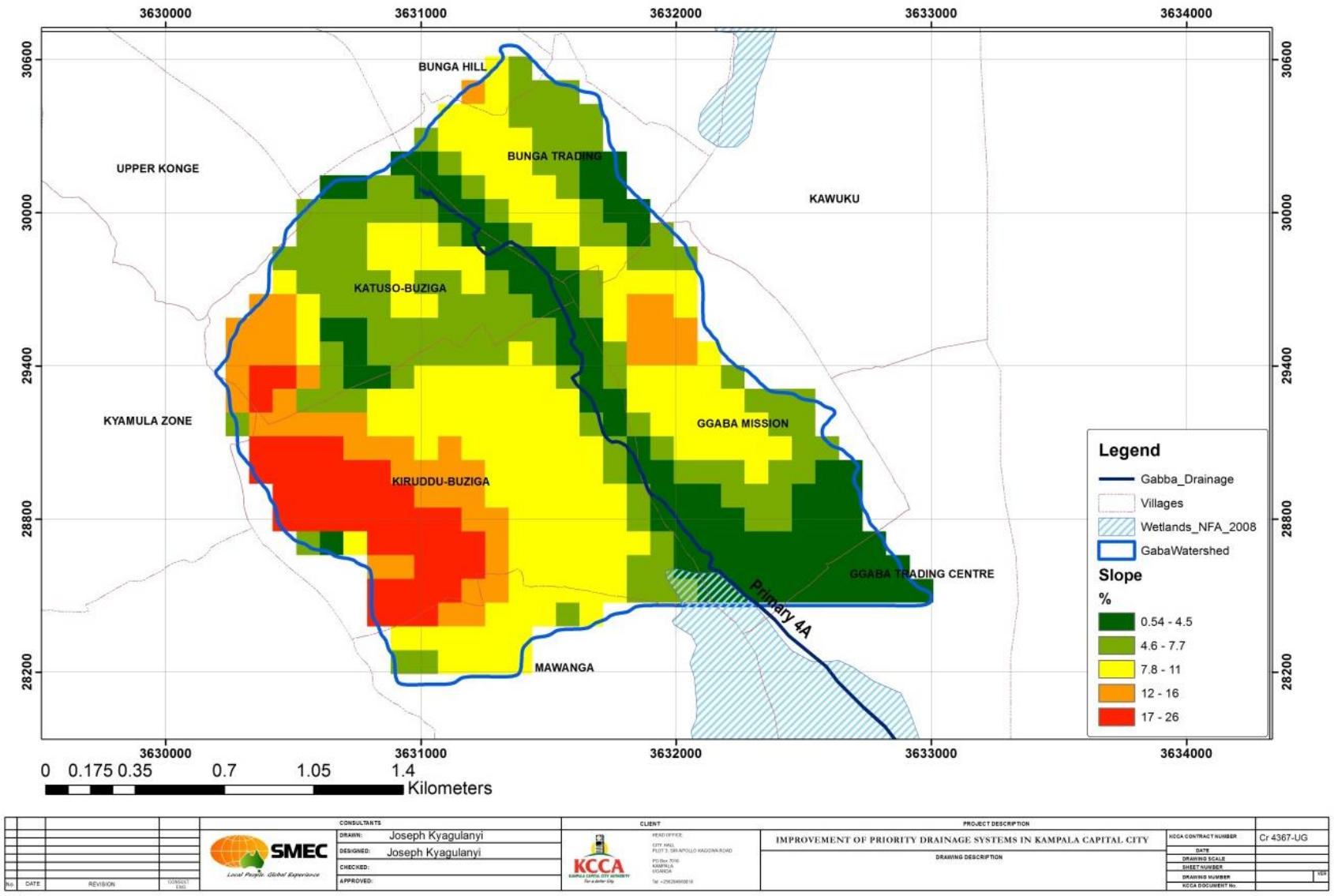


Figure 5-34: Slope of Kansanga catchment



CONSULTANTS		CLIENT		PROJECT DESCRIPTION			
SMEC Local People. Global Experience	DRAWN: Joseph Kyagulanyi DESIGNED: Joseph Kyagulanyi CHECKED: APPROVED:	KCCA KAMPALA CAPITAL CITY AUTHORITY	HEAD OFFICE: CITY HALL PLOT 5, SIR APOLLO KAGGWA ROAD PO Box 7016 KAMPALA UGANDA Tel: +256256490816	IMPROVEMENT OF PRIORITY DRAINAGE SYSTEMS IN KAMPALA CAPITAL CITY DRAWING DESCRIPTION	KCCA CONTRACT NUMBER DATE DRAWING SCALE SHEET NUMBER DRAWING NUMBER KCCA DOCUMENT No.	Cr 4367-UG	

Figure 5-35: Slope of Gaba catchment

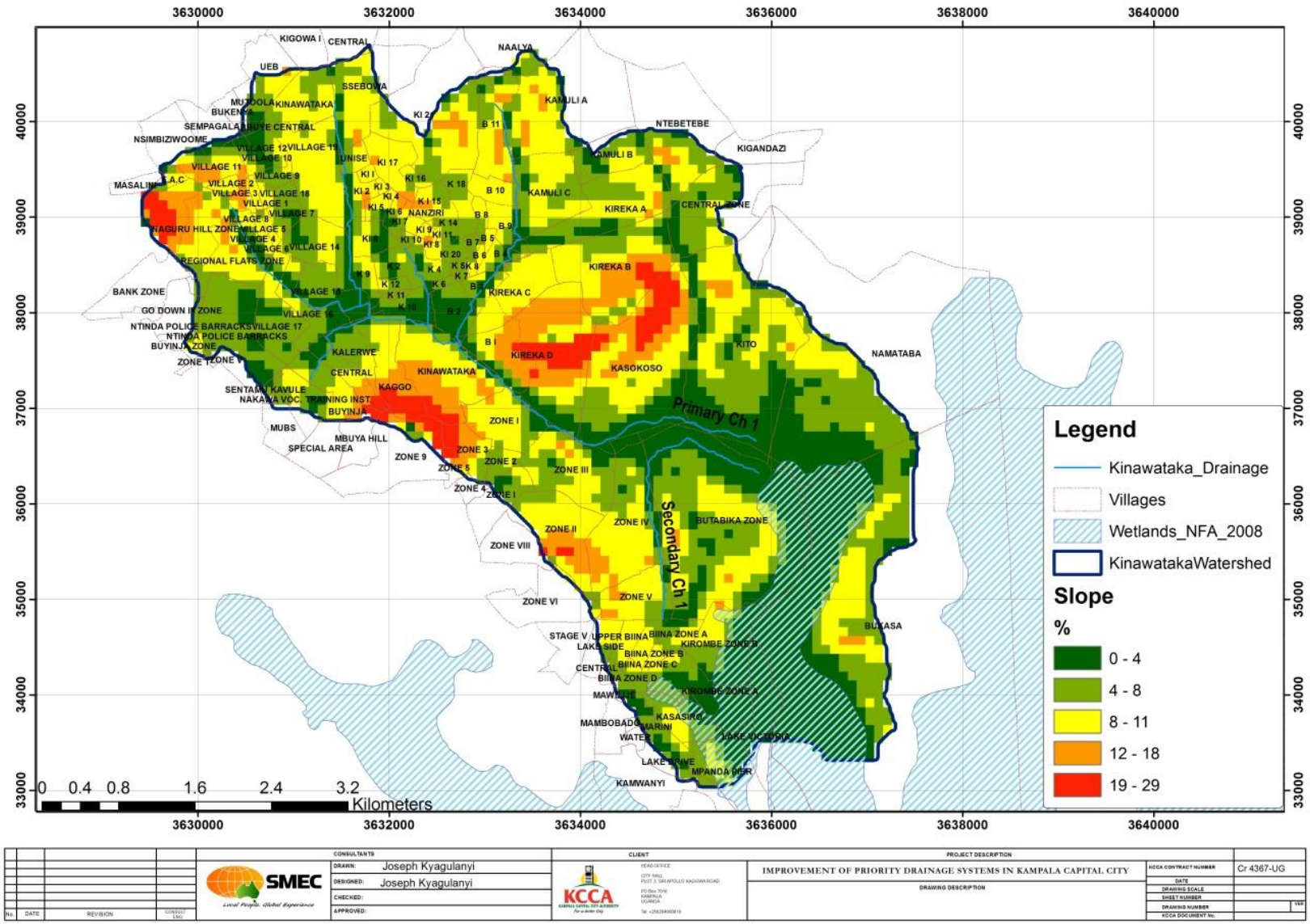


Figure 5-36: Slope of Kinawataka Catchment

5.2.1.4 Air Quality

The purpose of these measurements is to establish a baseline reference with respect to air quality within the project area, to which any future related project impacts can be compared. It is not an air quality audit of the project area. Table 5-17 provides results of the air quality measurements.

Table 5-17: Results of air quality measurements in the Project area

Location (UTM 36N coordinates)	Particulates ($\mu g/m^3$)	CO_2 (%)	O_2 (%)	H_2 (ppm)	NO (ppm)	VOCs (ppm)	CO (ppm)	Notes
446237E, 34371N	5	0.03	20.9	4	1	0.9	ND	Public spring. Vehicular traffic. Easterly breeze.
446541E, 34781N	49	0.03	20.8	1	1	0.7	ND	Vehicular traffic.
448734E, 35076N	4	0.03	20.8	ND	1	1.0	ND	Multiple open stove fires.
448022E, 36054N	1	0.03	20.9	ND	1	1.0	ND	Green Valley Primary School Masanafu.
448260E, 37186N	1	0.03	20.9	1	1	1.1	ND	
449763E, 37689N	16	0.03	20.8	3	1	1.2	ND	
450698E, 37805N	1	0.03	20.8	1	1	1.1	ND	North westerly breeze
451312E, 36500N	10	0.03	20.9	4	1	1.1	ND	Vehicular traffic.
452545E, 37083N	17	0.03	20.9	4	1	1.3	3	Vehicular traffic
452964E, 38881	38	0.03	20.9	1	1	1.3	ND	Highway traffic. Southerly breeze.
450521E, 41398N	11	0.03	20.9	1	ND	0.4	ND	Refrigerator repairs nearby.
452498E, 39977N	44	0.03	20.9	1	ND	0.5	ND	Vehicular traffic
453785E, 40586N	3	0.03	20.8	ND	ND	0.6	ND	Vehicular traffic. Construction site nearby.
455761E, 40441N	11	0.03	20.9	ND	1	0.8	ND	Distant vehicular traffic.
457008E, 38281N	8	0.03	20.9	2	1	0.9	ND	Vehicular traffic. Distant construction activities.
458028E, 37473N	8	0.03	20.9	ND	1	0.9	ND	Vehicular traffic.
457744E, 36704N	78	0.03	20.9	ND	1	0.8	ND	Vehicular traffic. Southerly breeze.

Location (UTM 36N coordinates)	Particulates (µg/m³)	CO_2 (%)	O_2 (%)	H_2 (ppm)	NO (ppm)	VOCs (ppm)	CO (ppm)	Notes
458949E, 37882N	29	0.03	20.8	ND	1	0.9	ND	
459599E, 37504E	6	0.03	20.9	1	1	1.0	ND	
459980E, 38555N	20	0.03	20.9	1	1	0.8	ND	Southerly breeze
458063, 38808N	11	0.03	20.9	2	1	0.7	ND	Southerly breeze
461351E, 36235N	9	0.03	20.9	1	ND	ND	ND	
461456E, 34919N	77	0.03	20.9	ND	ND	0.5	ND	Vehicular traffic. Southerly breeze.
458554E, 28304N	5	0.03	20.9	ND	1	0.6	ND	Distant vehicular traffic
457760E, 29451N	30	0.03	20.9	ND	ND	0.7	ND	Vehicular traffic. Southerly breeze.
458797E, 29878N	12	0.03	20.9	ND	ND	0.9	ND	
457478E, 31834N	6	0.03	20.9	2	1	0.8	ND	Southerly breeze.
456248E, 30853N	25	0.03	20.9	ND	ND	0.7	ND	Vehicular traffic
455571E, 32285N	19	0.03	20.9	1	ND	0.6	ND	
454851E, 31539N	15	0.03	20.9	2	ND	0.6	ND	Easterly breeze
455089E, 31955N	52	0.03	20.9	2	ND	0.6	ND	Vehicular traffic. Distant maize mill operation.
453241E, 32644N	47	0.03	20.9	1	ND	0.8	ND	Nkere Infant School. Vehicular traffic

Note: ND = Not Detected

Inference from measurements:

At all measurement locations, no detectable levels of NO_2, H_2S, Cl_2, ClO_2, SO_2 and combustible gases were encountered. These measurements indicate a generally pristine environment with respect to air quality.

5.2.1.5 Ambient Noise

The purpose of these measurements is to establish a baseline reference with respect to ambient noise within the project area to which any future related project impacts can be compared. It is not a noise level audit of the project area.

Table 5-18: Results of ambient noise measurements in Project area

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
446237E, 34371N	75.9	57.4	51.5	54.5	Human conversations. Vehicular traffic.
446541E, 34781N	71.6	55.7	48.0	52.5	Human conversations. Vehicular traffic. Distant chainsaw operation.
448734E, 35076N	73.1	56.0	49.0	52.5	Human conversation. Portable radio playing.
448022E, 36054N	66.1	49.7	44.5	47.5	Green Valley primary School. Vehicular traffic. Human conversations. Chirping birds. Rustling leaves.
448260E, 37186N	58.0	44.8	41.5	43.5	Chirping birds. Rustling leaves. Distant public address system playing.
449763E, 37689N	79.8	57.7	40.5	45.0	Playing children. Chirping birds.
450698E, 37805N	63.7	47.4	41.0	44.0	Human conversation. . Chirping birds. Rustling leaves.
451312E, 36500N	68.9	51.7	44.5	46.5	Vehicular traffic. Human conversations.
452545E, 37083N	89.8	63.8	50.0	56.5	Vehicular traffic. Human conversations.
452964E, 38881	79.9	69.2	57.5	66.5	Highway traffic.
450521E, 41398N	84.6	66.8	59.0	63.0	Vehicular traffic. Human conversations.
452498E, 39977N	70.8	59.5	52.0	56.5	Vehicular traffic. Human conversations.
453785E, 40586N	66.9	52.6	44.5	48.5	Vehicular traffic. Construction activity.
455761E, 40441N	59.5	43.6	39.0	42.0	Distant vehicular traffic. Rustling tree leaves. Chirping birds.
457008E, 38281N	72.7	55.1	47.0	50.0	Distant vehicular traffic. Rustling tree leaves. Chirping birds. Distant construction activity.
458028E, 37473N	72.3	55.6	52.5	53.5	Vehicular traffic. Rustling tree leaves. Human conversation.
457744E, 36704N	83.8	68.2	63.0	67.0	Vehicular traffic. Human conversation

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
458949E, 37882N	63.4	48.3	45.0	47.5	Chirping birds. Rustling tree leaves. Human conversation
459599E, 37504E	74.6	49.1	44.5	46.5	Chirping birds. Distant public address system playing.
459980E, 38555N	68.1	50.6	47.0	49.5	Chirping birds. Distant public address system playing. Human conversations.
458063, 38808N	77.7	55.6	47.0	51.5	Vehicular traffic. Chirping birds. Distant public address system playing. Human conversations.
461351E, 36235N	63.8	50.2	41.5	47.0	Vehicular traffic. Chirping birds. Distant public address system playing. Human conversations.
461456E, 34919N	71.5	55.5	40.5	45.5	Vehicular traffic. Chirping birds. Human conversations.
458554E, 28304N	73.8	50.6	44.0	45.5	Vehicular traffic. Rustling tree leaves. Chirping birds.
457760E, 29451N	75.0	58.2	49.5	54.0	Barking dog. Vehicular traffic. Chirping birds. Distant public address system playing. Human conversations.
458797E, 29878N	67.7	46.6	41.0	44.5	Rustling tree leaves. Chirping birds.
457478E, 31834N	65.8	50.4	46.0	48.5	Barking dogs. Distant generator set running.
456248E, 30853N	73.0	61.8	55.5	60.0	Vehicular traffic. Chirping birds. Distant public address system playing. Human conversations
455571E, 32285N	69.2	50.0	43.0	45.5	Chirping birds. Human conversations. Rustling tree leaves.
454851E, 31539N	62.9	46.5	41.5	45.0	Chirping birds. Human conversations. Aircraft passing overhead.
455089E, 31955N	72.3	60.3	53.0	57.0	Vehicular traffic. Human conversation. Distant maize mill operation.

Location	Sound Pressure Level dB(A)				Notes
	L_{Max}	L_{eq}	L_{90}	L_{50}	
453241E, 32644N	77.6	63.7	57.0	62.5	Nkere Infant School. Distant public address system playing. Vehicular traffic.

Inference from measurements:

The NEMA L_{Aeq} standard specifies a day-time limit of 50 dB(A) for residential areas. From this sample of 32 measurement locations, only 19% of these locations had an L_{Aeq} below the national limit. In over 80% of the locations sampled, the ambient noise levels were above the national limit. This is mainly to due to combinations of noisy activities in Kampala City including humming industrial background noise and traffic movement.

5.2.1.6 Hydrology and Water Quality

5.2.1.6.1 Hydrology

The catchment areas within the Project area are within the larger basins of Lake Victoria and Lake Kyoga as shown in Table 5-19.

Table 5-19: Hydrological basins of the Project catchment areas

Drainage System	Wetlands	Larger Basin
2 (Lubigi)	Lubigi Jugula Nabisasiro Nsooba Bulyera Kyabatola	Lake Kyoga
4 (Kanasanga)	Kansanga	Lake Victoria
4A (Gaba)	Kansanga	Lake Victoria
6 (Kinawataka)	Kinawataka	Lake Victoria

Source: Kampala Drainage Master Plan, Volume 2, Main Report – Part I, BKS ACRES

Primary 2 - Lubigi

Lubigi wetland, located on the North West side of Kampala, feeds into Lake Kyoga through the river Mayanja network. The Lubigi wetland is a tributary to Mayanja-Kato system in the north and receives water from the Nsooba wetland system.

The Lubigi catchment area is currently 2.85 km^2 (Gumm, 2011) and drains areas of Makerere, Katanga, parts of Mulago, Kalerwe, Bwaise and areas along the northern bypass. The catchment receives two distinct rainfall seasons (February to June and August to November), and is part of the larger Victoria basin climatic zone which receives between 1200-2000 mm per year. Evaporation is about 1151mm/yr. Runoff from the catchment is via a series of intricately linked channels consisting of tertiary drains,

secondary drains and the main primary channel (Nsooba channel). The tertiary drains are small, open drains (usually unlined) between buildings that convey a combination of storm runoff and wastewater into a system of larger channels, or secondary channels. Secondary channels are natural streams (about 1–2 m wide) located in valleys between gentle sloping hills, which characterize the catchment and Kampala city. These streams are partly channelized and lined with stones at the sides especially in the downstream areas where there is high concentration of human settlement and industrial development. The secondary channels finally discharge into the primary channel, the Nsooba channel (2 – 4 m wide) and eventually in Lubigi swamp located downstream. The Nsooba channel, which is also partly lined in the downstream areas, accumulates all water from the tributaries (tertiary and secondary drains). Most runoff from the upper and more urbanized part of the catchment (28 km^2) discharges through Bwaise slum.

Primary 4 and 4A - Kansanga and Gaba

The Kansanga wetland is seasonal upstream and permanent downstream. It is formed along the Kansanga, which occupies the valley between Makindye, Nsambya, Bunga and Tank hills. It is part of the extensive natural wetlands fringing the northern shores of Lake Victoria. The Kansanga catchment is currently 29.01 km^2 while the Gaba catchment area is 4.54 km^2. The area is characterised by papyrus which dominates the permanent wetland downstream.

Primary 6 - Kinawataka

The Kinawataka catchment is part of a tributary system that flows south towards Lake Victoria. It is one of the largest wetlands in Kampala and is currently 5.29 km^2. The Kinawataka wetland is formed along Kinawataka River which occupies a valley below Banda, Ntinda, Kireka, Mbuya and Mutungo hills, which eventually drains into Lake Victoria.

The Kinawataka catchment and swamp are under extreme pressure due to uncontrolled development activities, the most detrimental being the industrial development.

5.2.1.6.2 Water quality

As indicated before, the channels convey a mix of storm runoff and domestic wastewater/sewage. To establish the quality of water within these channels as a baseline for future reference and informing on project impacts; eight (08) water samples were collected at selected representative locations along the drainage channels. The sampling locations were selected at areas within the vicinity where the channels would pour into the receiving swamps.

Results and Analysis

Table 5-20 shows the results of the in-situ measurements taken against the National Effluent Standards while Table 5-21 indicates the results of the laboratory analysis. The laboratory analysis certificates are attached in Volume 2; Appendices

The laboratory analysed results indicated on the whole, a generally acceptable water quality in terms of the physicochemical characteristics. However the bacteriological water quality was poor in most of the drainage channels. The highlighted figures in Table 5-21 show those parameters that did not meet the national standards. Parameters measured that do not have national standards against which comparison can be made were given a label ‘ns’.

The results indicated poor bacteriological quality for the samples taken from Lubigi Primary, Secondary Channel 6, Lubigi and the Gaba Primary Channel. This was expected considering that these channels traverse through very densely populated slum areas where the residents have been known to release their sewage waste into the channels especially during periods of rain.

The high Total Suspended Solids results for the Gaba and Kansanga Primary channels may be attributed to the heavy downpour that preceded the sampling at these locations resulting in a silt-laden runoff ending up in the channels. The COD values for Secondary 3 in Lubigi system, Secondary 6 in Lubigi, Kansanga and Gaba Catchment were also above the national standards probably because of their proximity to heavy settlements where many of the residents use the same channels as dumping ground for their solid waste.

The water sample from Kinawataka Catchment primary had the highest COD level of 222 mg/l which is above the national standards. This could be explained by heavy presence of industrial establishments within the catchment drained by the Kinawataka Catchment primary. However, all the other parameters were within the National Effluent Discharge Standards.

Table 5-20: In-situ Measurements Results

Parameters	Units	Lubigi Primary	Sec-3 Lubigi Point 1	Sec-3 Lubigi Point 2	Sec-6 Lubigi Point 1	Sec-6 Lubigi Point 2	Kansanga Primary	Gaba Primary	Mag Grant (Kinawataka Primary)	National Effluent Discharge Stds
pH		7.42	6.69	7.17	7.72	7.65	7.83	7.22	7.55	6.0-8.0
Temperature	°C	28.17	22.94	25.14	32.6	31.53	27.79	28.62	27.94	20-35
Dissolved Oxygen	mg/l	3.52	3.71	4.14	4.20	3.8	2.41	2.31	1.87	ns
Electrical Conductivity	µS/cm	512	487	433	676	669	288	401	410	ns
Total Dissolved Solids	ppm	256	243	216	338	334	144	197	205	1500
ORP	mV	-7.6	-80.2	-17.3	23.8	6.2	21.3	-7.00	-46.3	ns
Resistivity	MΩcm	0.0020	0.0021	0.0023	0.0015	0.0015	0.0035	0.0025	0.0024	ns
Salinity	PSU	0.25	0.23	0.21	0.32	0.32	0.14	0.19	019	ns
Pressure	mmHg	880.8	883.0	884.9	883.7	883.2	882.0	882.8	880.8	ns

Table 5-21: Laboratory Analysis Results

Parameters	Units	Lubigi Primary	Sec-3 Lubigi Point 1	Sec-3 Lubigi Point 2	Sec-6 Lubigi Point 1	Sec-6 Lubigi Point 2	Kansanga Primary	Gaba Primary	Mag Grant (Kinawataka Primary)	National Effluent Discharge Stds
pH		6.8	7.2	7.2	7.6	6.8	7.7	7.3	7.5	6.0-8.0
Total Dissolved Solids	mg/l	367	328	292	459	459	201	269	280	1500
Total Nitrogen	mg/l	2	1.2	0.1	0.9	1	3.2	0.8	0.5	20
Total Phosphorous	mg/l	1.9	1.6	0.6	2.7	2.7	4.8	1.6	1	10
Total Suspended Solids	mg/l	12	10	12	18	15	**308**	**106**	14	100
Potassium: K^+	mg/l	19	20	20	24	22.6	15	14.3	12	50
COD	mg/l	91	44	**202**	**136**	**112**	**184**	**200**	**222**	100
BOD	mg/l	50	26	38	**53**	39	**52**	25	36	50
Faecal coliforms	CFU/100ml	**26400**	1400	30	**48800**	**24400**	240	**6200**	1600	5000

5.2.1.7 Solid Waste Management

Channel sections through residential areas, especially the densely populated areas generally had poor solid waste management with open waste disposal of domestic waste near and into the channels. This solid waste disposal problem has caused blockage of the culvert crossings in many parts, further aggravating the flooding problem. In areas with no access roads along the drainage channels, the garbage and silt cleaned out of the drain is collected along the channel edges, only to end up in the channel again during the rains. Garbage in the drains causes blockages and constrictions along the channel, preventing the conveyance of the design storm water.

The slum areas such as Katanga in Mulago also used the channels for sewage disposal. As a result, the channels double as storm water and sewage drains.

Figure 5-37: Open dumping of garbage along Secondary 6

Figure 5-38: Silt dredged out of channel heaped along the edge

Figure 5-39: Typical example of floating garbage blocking a channel

Figure 5-40: Typical sanitation situation of channel section through residential areas

5.2.1.8 Traffic Volume on Major Roads within the Project Area

The project is closely linked to roads since some of the channels (primary and secondary) are along busy roads. Disruption of traffic flow is expected to be one of the critical impacts during construction of the project because road crossings such as bridges and culverts will be installed / replaced in some sections. The final drainage channel improvement designs will determine the location of culvert crossings along the roads that will be affected during the project implementation.

Figure 5-41: Example of a busy road within the Project area

5.2.1.8.1 Primary 2 – Lubigi

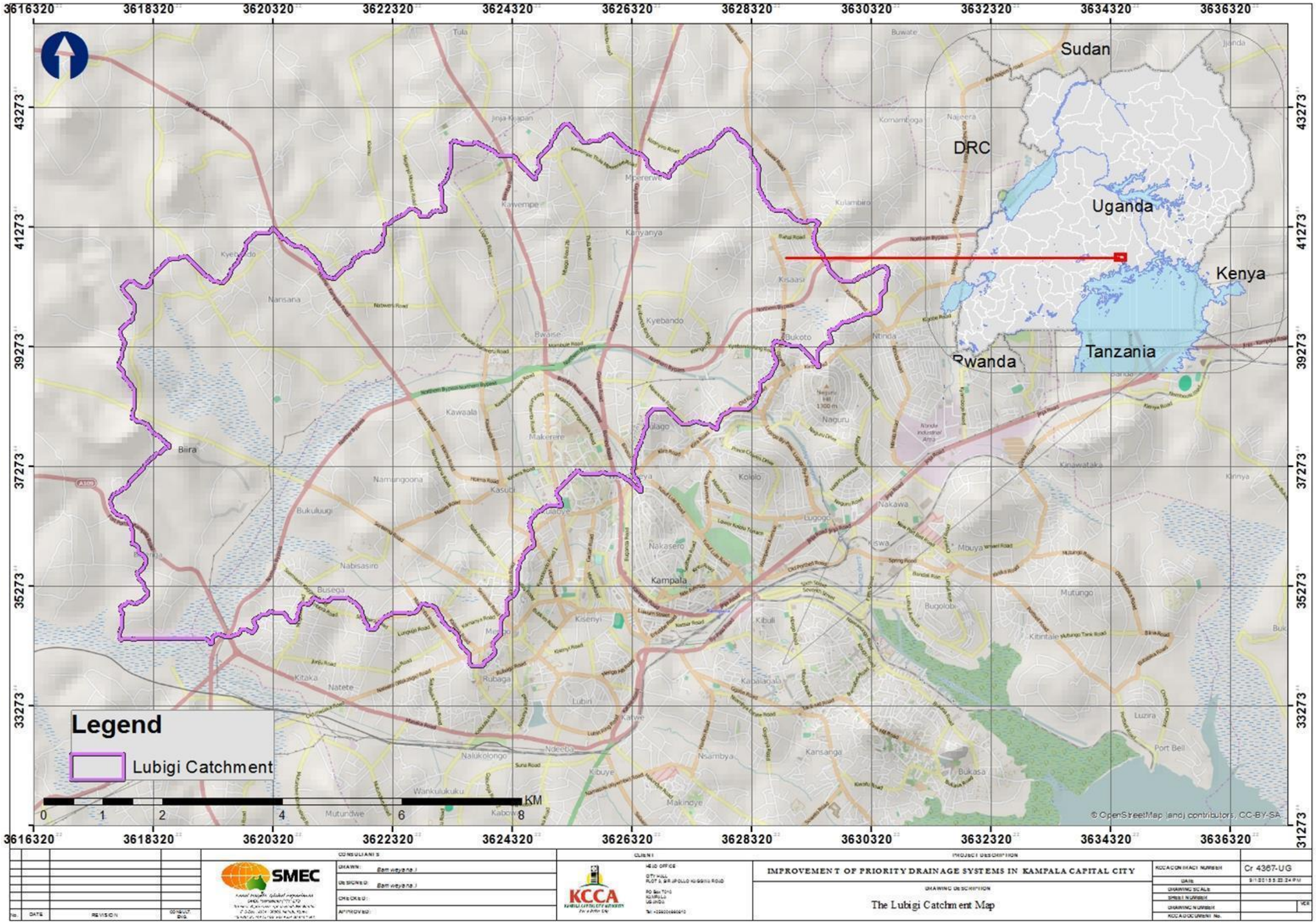
The major roads within the Primary Channel 2 catchment area include Sir Apollo Kaggwa road, Kampala Northern bypass, Mulago road, Bombo road, Makerere-Kasubi road, and Kitante road. Map 5-7 shows the roads within Lubigi catchment.

5.2.1.8.2 Primary 4 & 4A – Kansanga and Gaba

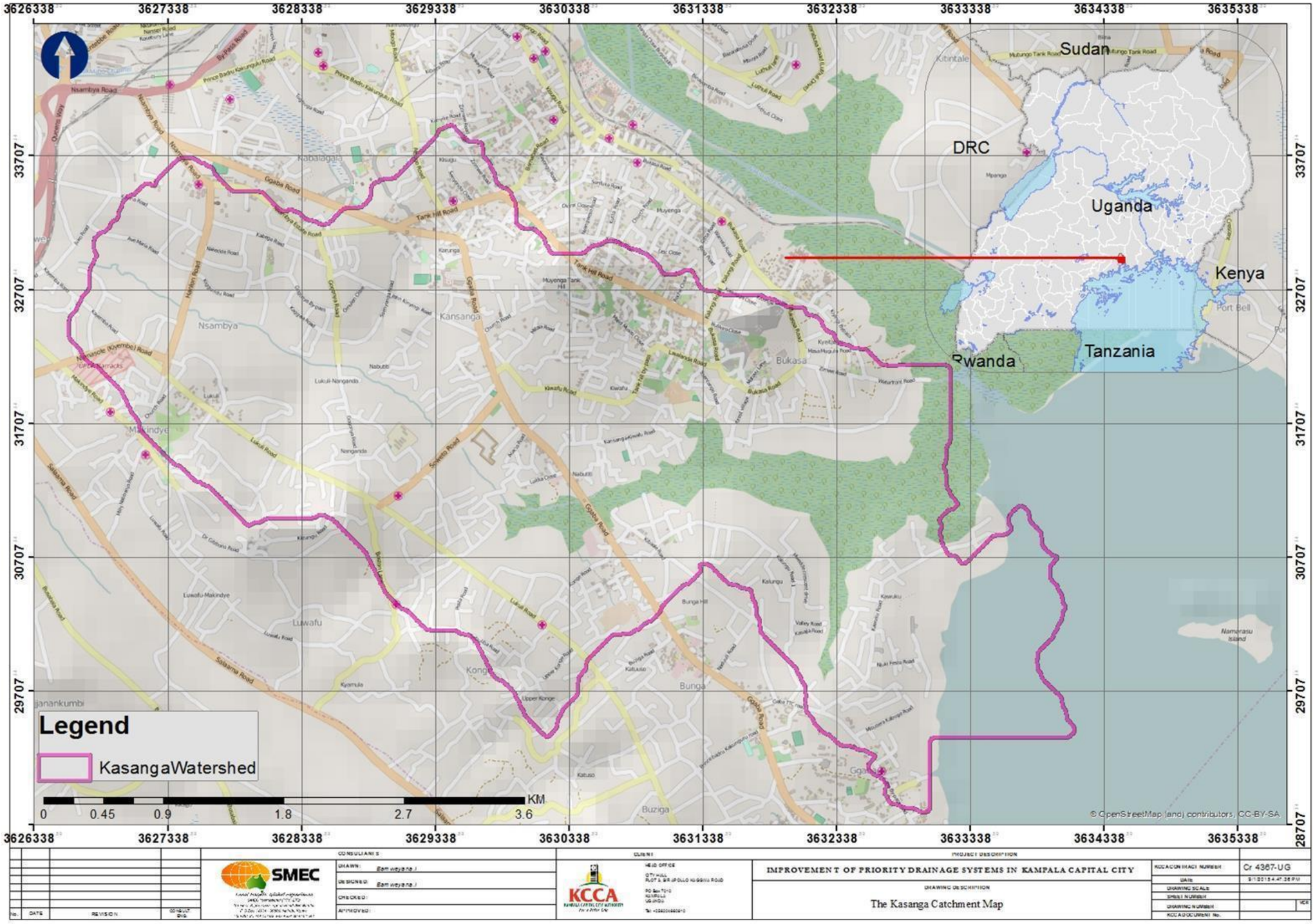
The major roads within the Primary Channel 4 catchment area include Gaba road, and Gogonya road. Map 5-8 and Map 5-9 show the roads within the Kansanga and Gaba catchment areas.

5.2.1.8.3 Primary 6 - Kinawataka

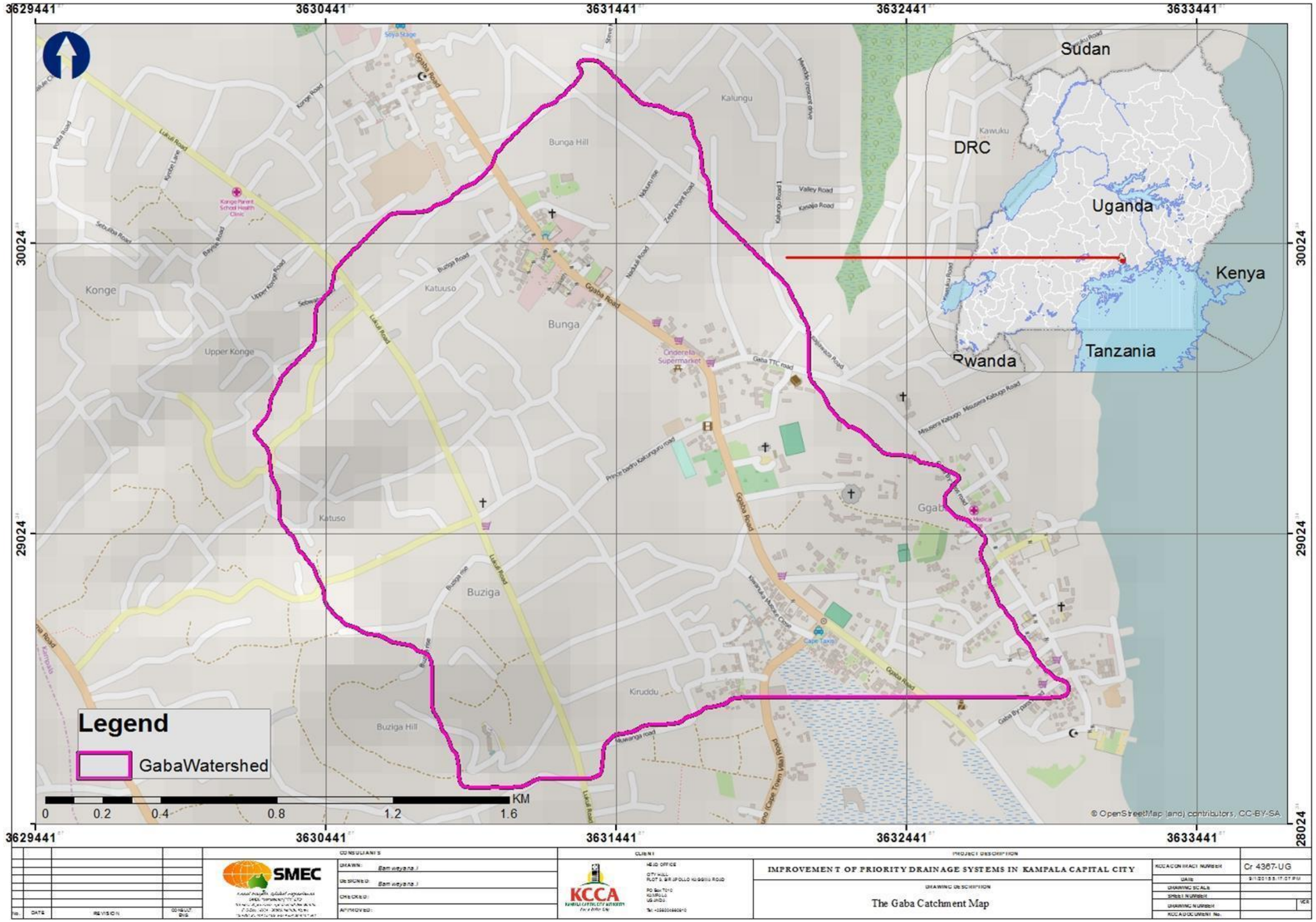
The Project has a number of major proposed road works within the area of influence of Primary 6. UNRA is at the preliminary design stage for Kampala Southern bypass and Kampala-Jinja expressway, which affect the entire Primary 6 channel. Map 5-10 shows the roads within the Kinawataka catchment area.



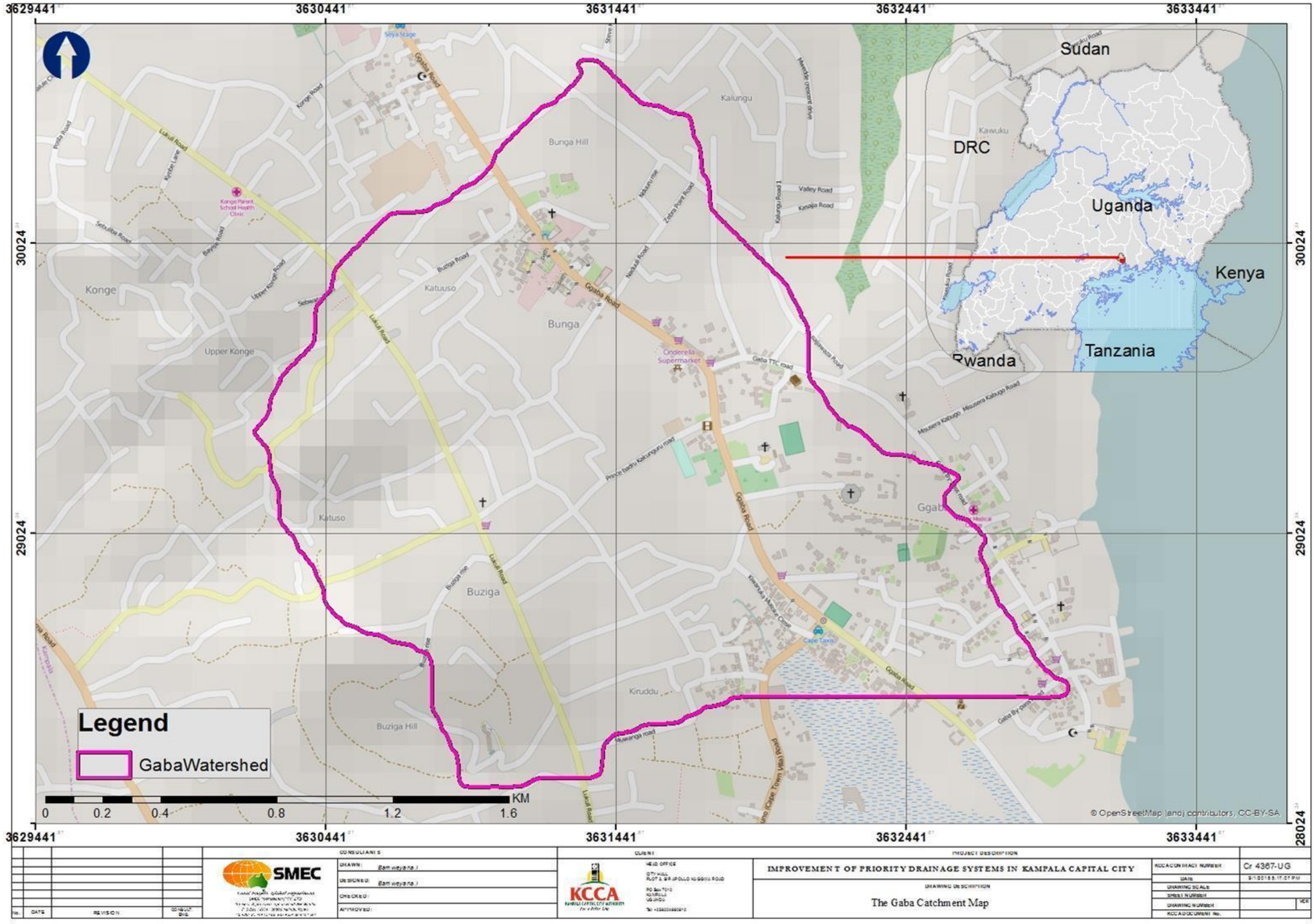
Map 5-7: Roads within Lubigi catchment



Map 5-8 : Roads within Kansanga catchment



Map 5-9: Roads within Gaba catchment



Map 5-10: Roads within Kinawataka catchment

5.2.2 Socio-economic Baseline

This Section provides a description of the demographic, social and economic characteristics of the study area within the national context. This baseline will be used to assess the socio-economic impacts of the project and to compare the effectiveness of the mitigation measures in the future. It provides an overview of the key socio-economic indicators in the project area, as well as a review of attitudes and expectations, focusing on data from the communities that lie within and along the route of the proposed drainage channels of Lubigi (System 2), Kansanga and Gaba (System 4 and 4A), and Kinawataka (System 6) in Kampala district.

Information regarding the socio-economic status of the Project areas was obtained through administering questionnaires, although people not directly affected by the project were also included in the study. The following information was captured from the respondents:

- Age;
- Sex;
- Size of household;
- Income and Expenditure;
- Education and Literacy;
- Vulnerability status;
- Livelihoods;
- Land use and ownership; and
- Attitudes and preferences.

5.2.2.1 Demographic Information

a) Average size of the affected Household

The size of the household is a matter of great importance not only for the country as a whole but also for the welfare and health of the individual, the family and the community. From census results in the project affected area, the highest mean household size was found to be 9 and above people with 35.2% of the respondents falling into this category. This shows a high level of dependency of households given the number of people living within the households in the project affected area. More so, such family sizes come with attendant implications of poor health, inability to provide adequately for the education of the children, low standard of leaving and the inability to fulfil ones' is dreams. Table 5-22 shows the average number of people in the households within the Project area.

Table 5-22: Average number of people living within the household

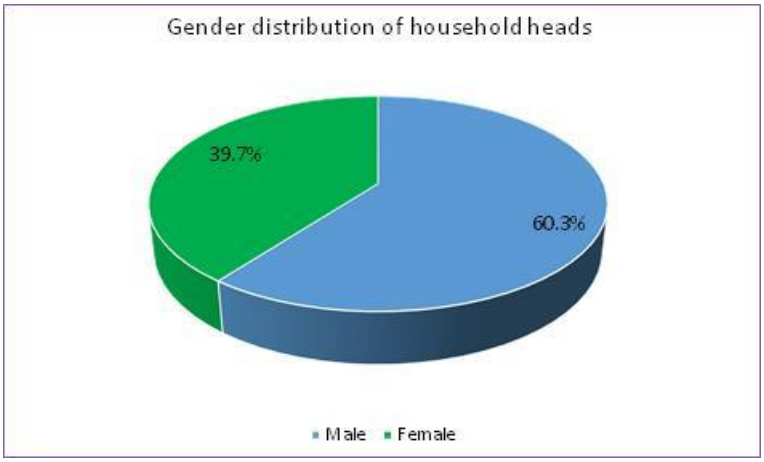
Average number of people	Percentage
1-2 people	8.2
3-4 people	16.4
5-6 people	18.8
7-8 people	21.5
9 and above	35.2
Total	**100**

Source: Primary data

b) Gender distribution of household heads

Gender issues are very important indicators of human development, in relation to employment opportunities and providing for households. From the census survey in the project area, it was

established there were more male respondents (60.3%) among households in comparison to the females respondents (39.7%) as shown in Figure 5-42. This means that decision making in the project area rests more with men. This is consistent with the UBOS 2014 report which indicates that there are more male household heads (79.45%) and (20.55%) female headed households.



Source: Primary data

Figure 5-42: Gender distributions among affected household heads.

Regarding marital status, majority of the PAPs were married (40.8%) and women (9.9%). A significant number of female headed households (10.3%) were divorced / separated while others were widowed (17.2%). This may render them vulnerable during implementation given the lack of equal opportunities for women. Table 5-23 provides a summary of the distribution of the marital status in the Project area.

Table 5-23: Marital status of people in project area

Gender	Marital status					Total (%)
	Single	Married	Divorced/separated	Widowed	Not married but living together	
Male (%)	3.1	40.8	2.7	2.3	11.8	**60.7**
Female (%)	4.6	9.9	7.6	14.9	2.3	**39.3**
Total (%)	**7.7**	**50.7**	**10.3**	**17.2**	**14.1**	**100**

Source: Primary data

In resettlement, planning requires consideration for age groups in project affected areas to align it with policy and plans for involuntary displacement. More so, dependencies in the affected households play a big role informing relevant authorities in mitigating impacts of displacement. In the entire project affected area in the Kampala district, the largest numbers of project affected household heads were male (60.4%) compared to females (39.6%). A significant number of household heads for both male and female (22.8%) are within the age bracket of 56 years and above. This demonstrates a total working group of 77.8% between the ages of 15 and 45 years, hence a negligible age dependency ratio in the project area. Table 5-24 presents the age distribution of the respondents.

Table 5-24: Age of respondent

Gender	Age- group of respondents in project area (years)					Total (%)
	15-25	26-35	36-45	46-55	56 and above	
Male (%)	1.5	11.3	20.4	15.8	11.3	**60.4**
Female (%)	0.8	5.7	9.8	12.5	10.9	**39.6**
Total (%)	**2.3**	**17.0**	**30.2**	**28.3**	**22.3**	**100.0**

Source: Primary data

5.2.2.2 Land use

Description of Land use and cover is extracted from shape file layers obtained from the KCCA GIS section. Table 5-25 presents a summary of the available land use and coverage per drainage catchment.

Table 5-25: Summary of the available land use and coverage per drainage catchment.

Drainage System	Area (km^2)	Residential (Low)-%	Residential (High)-%	Commercial (business)-%	Industrial (Light)-%	Future Development-%	Institutional-%	Wetlands-%	Green Belt-%
Lubigi	99.37	20.1	48.0	3.0	0.8	2.5	3.9	9.2	12.5
Kansanga	29.01	23.3	48.3	8.2	0.3	4.3	11.5	4.0	
Gaba	4.54	34.1	32.2	2.0		0.8	6.8	20.7	3.4
Kinawataka	54.59	21.5	30.5	4.1	3.6	1.1	5.6	22.2	11.4

Source: KCCA

The statistics give an indication of the population density within the drainage channels, and the developments therein, such as commercial and industrial which can help to predict the environment within which the construction works for the drainage channels will be undertaken. Lubigi and Kansanga catchments have the highest residential developments while Kinawataka has the biggest number of industrial developments and highest percentage of wetland cover. Kansanga catchment has the highest percentage of future developments and these will have to be put into consideration during the Project design to ensure minimum destruction of the new drainage infrastructure, as well ensure effective conveyance of the design flood for the design life of the drainage infrastructure.

5.2.2.2.1 Primary 2 - Lubigi

Majority of the land along the channel is built area, with some patches of green in a few areas (wetland natural vegetation and small crop gardens). Majority of the remaining wetlands are being reclaimed for residential, commercial, and industrial purposes, such as along Secondary 10 (Tirupati Business Park) and Secondary 8 (near Mulago-Kubiiri roundabout). The built up area is mostly residential dwellings and commercial structures, especially markets. *Map 5-11* shows the land use variations of the Primary Channel 2 catchment area.

Figure 5-43: Typical residential structures along the channels

Figure 5-44: The Tirupati Business Park located along Secondary 10, Primary 2

Figure 5-45: Small crop garden along Secondary 9

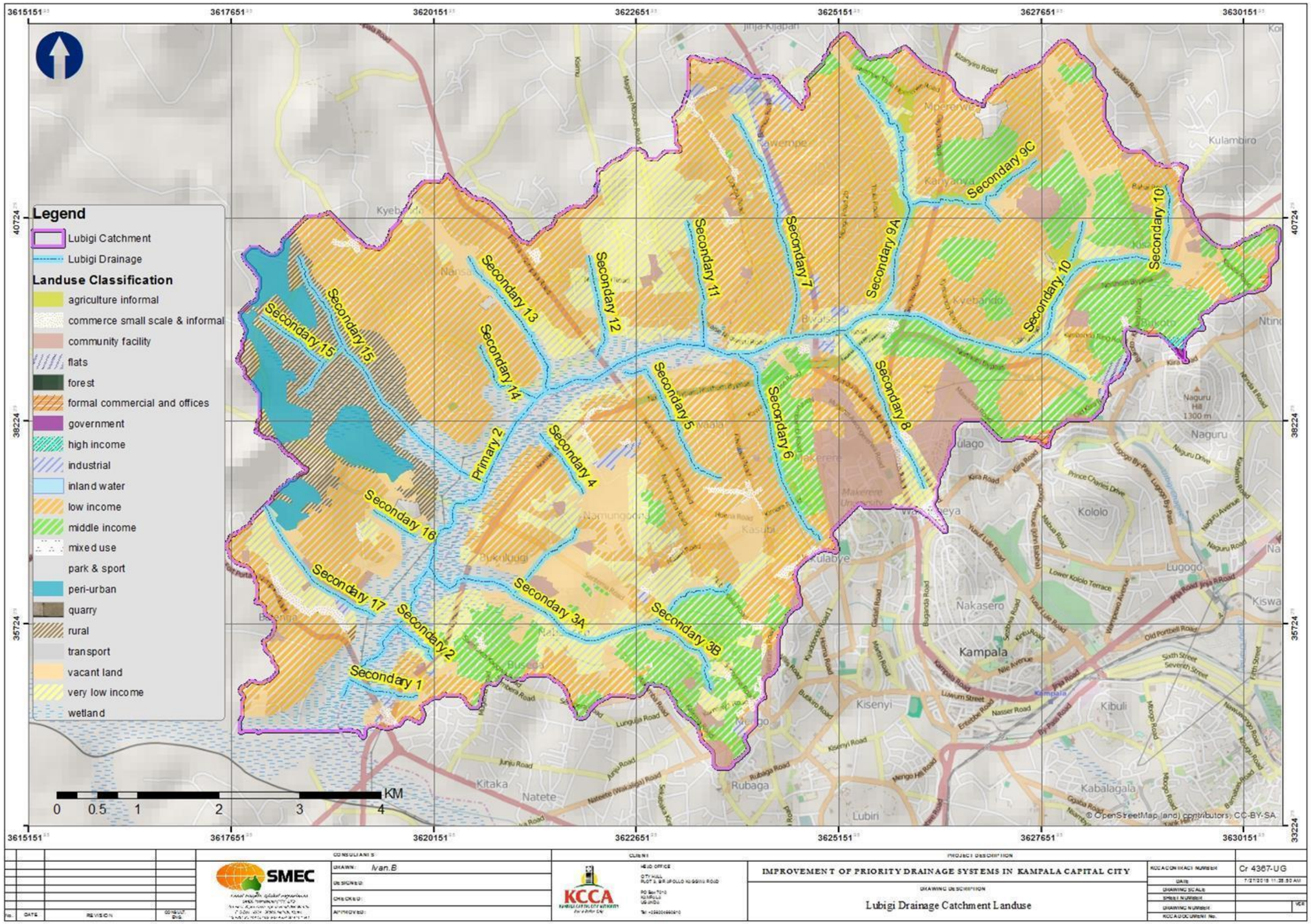
Figure 5-46: Wetland being reclaimed for development besides Tirupati Business Park

5.2.2.2.2 Primary 4 and 4A – Kansanga and Gaba

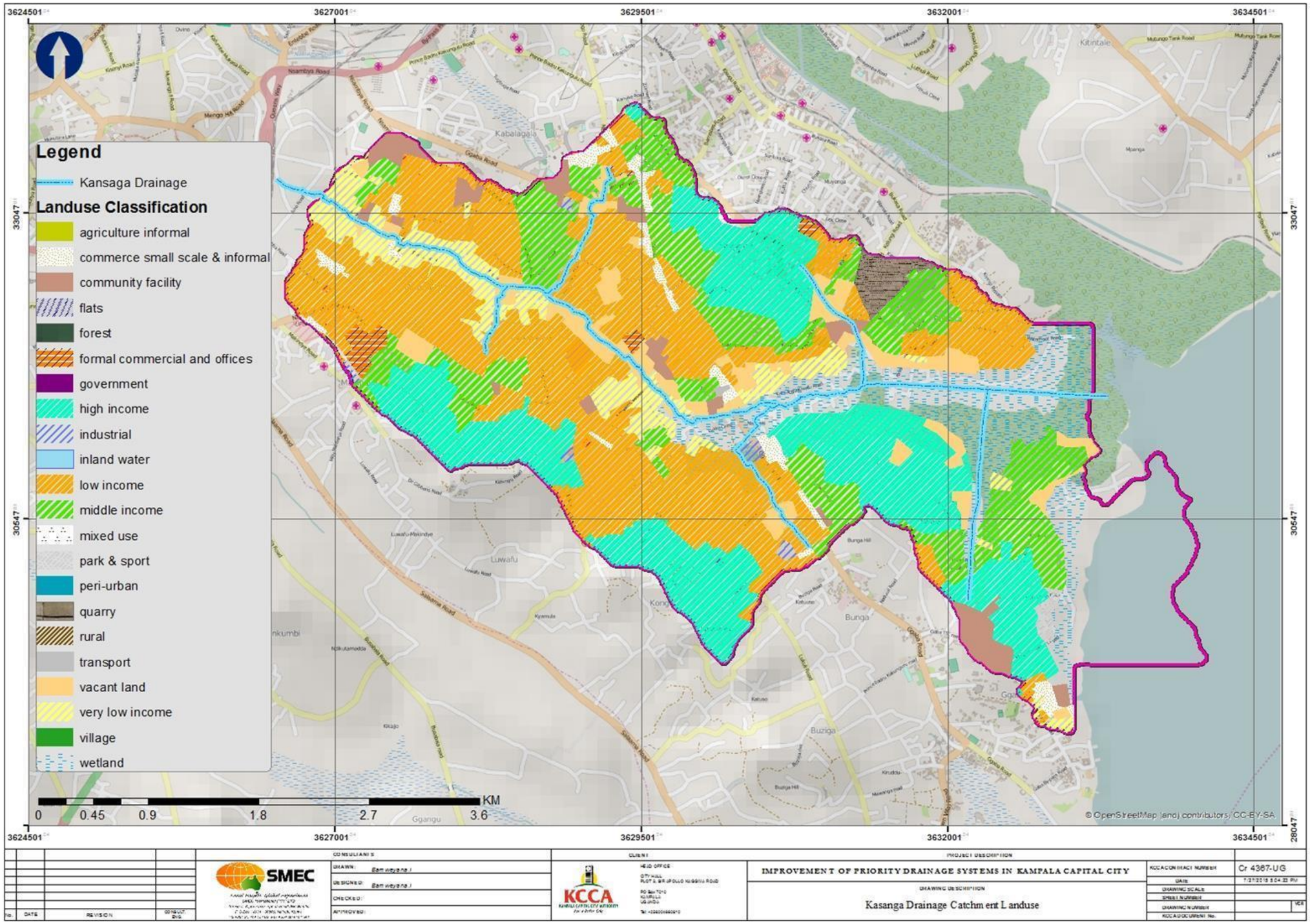
The channels flow through built up areas, with some patches of green in a few areas (wetland natural vegetation and small crop gardens). The built up areas are a combination of residential dwellings and commercial structures. *Map 5-12* and *Map 5-13* show the land use variation within catchment areas 4 and 4A, respectively.

5.2.2.2.3 Primary 6 - Kinawataka

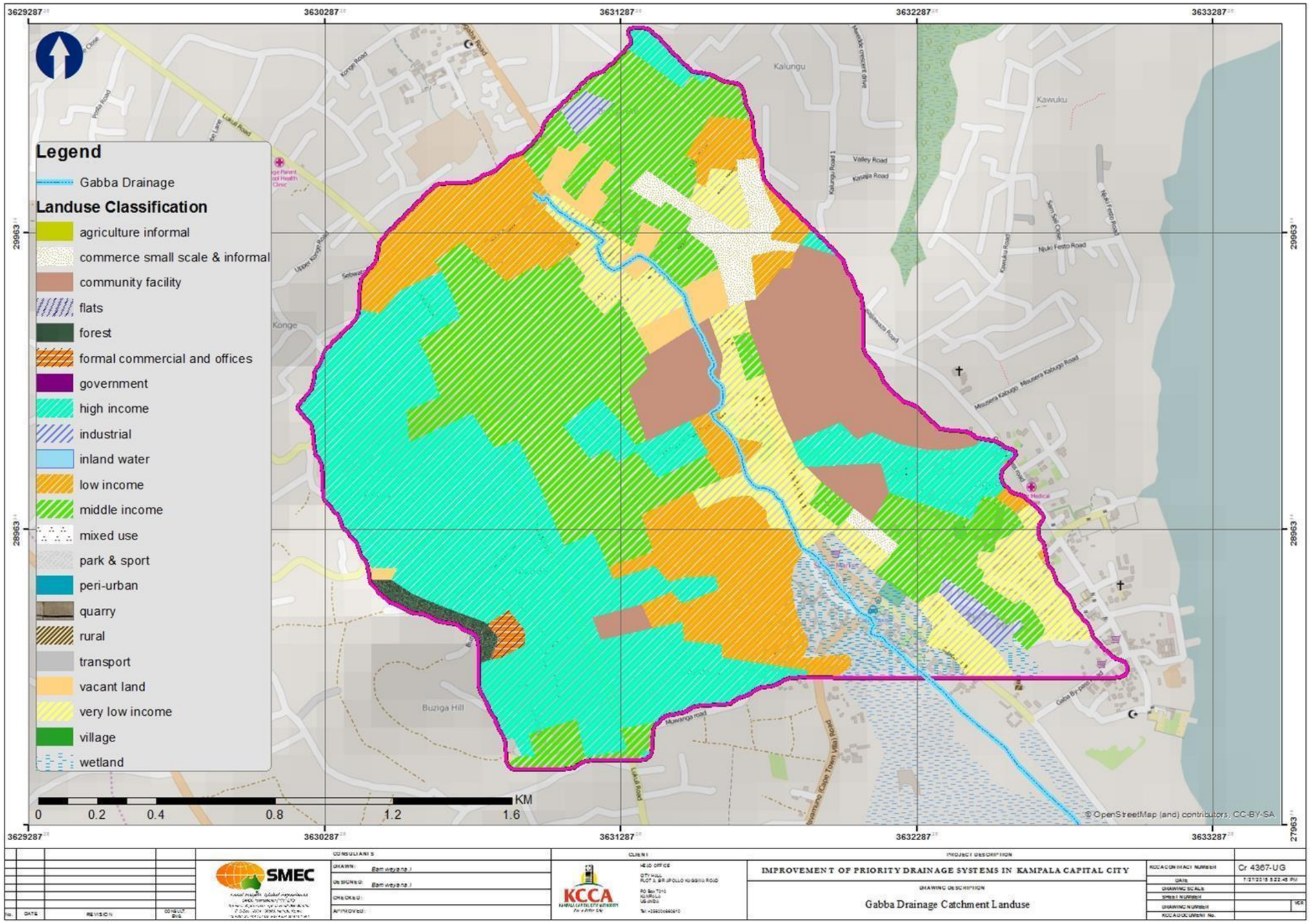
The area through which the Primary Channel 6 traverses is majorly an industrial area, as shown in *Map 5-14*.



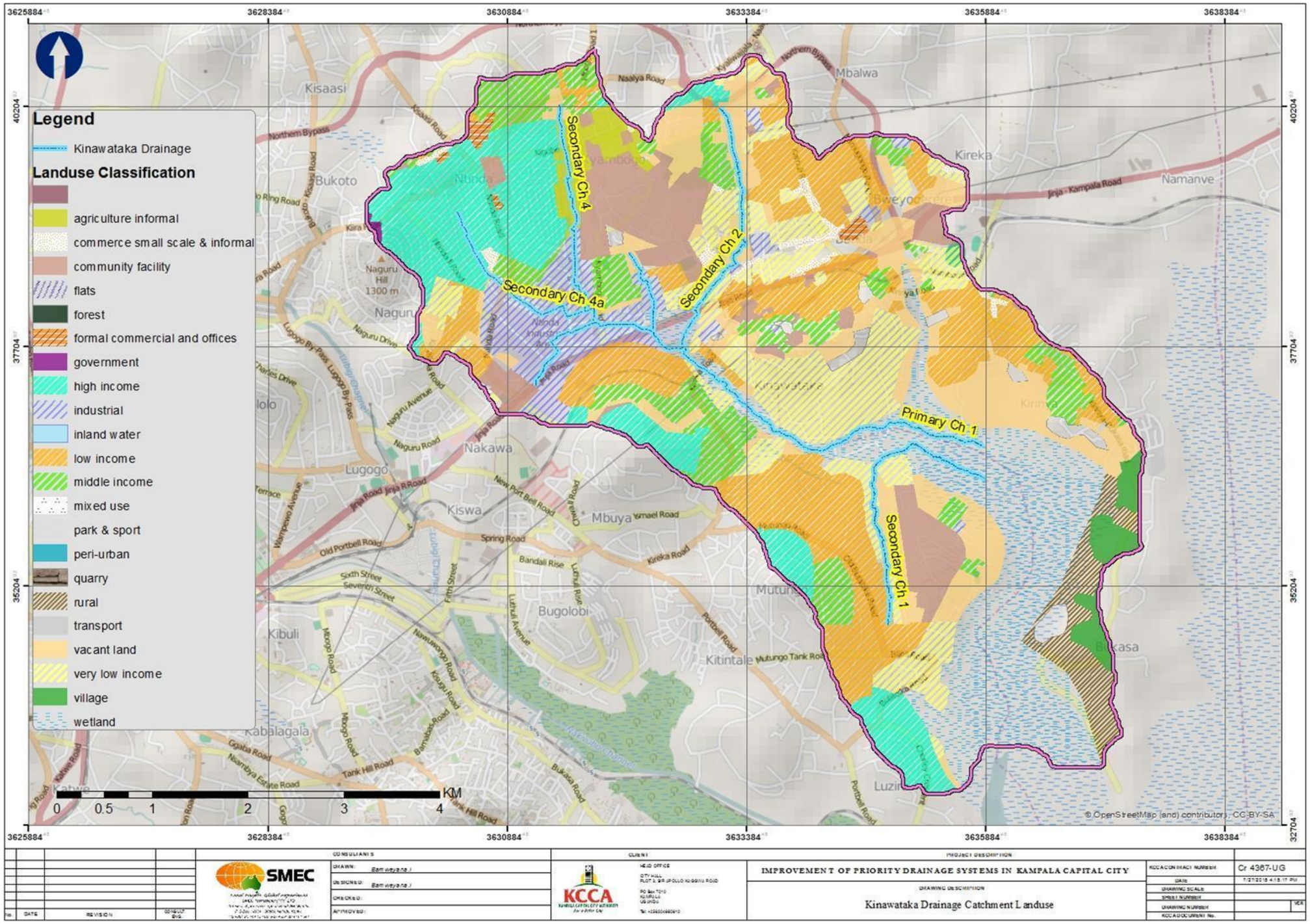
Map 5-11: Primary 2 Catchment land use



Map 5-12: Primary Channel 4 Catchment land use



Map 5-13: Primary Channel 4A Catchment land use



Map 5-14: Primary Channel 6 catchment land use

5.2.2.3 Land ownership/tenure

A significant number of people owned plots ("kibanja") with 71.7% on private mailo land (82.6%) which are not titled however some owned titles and documentation proving ownership. There were also cases of PAPs who were living on land under freehold tenure (0.4%).

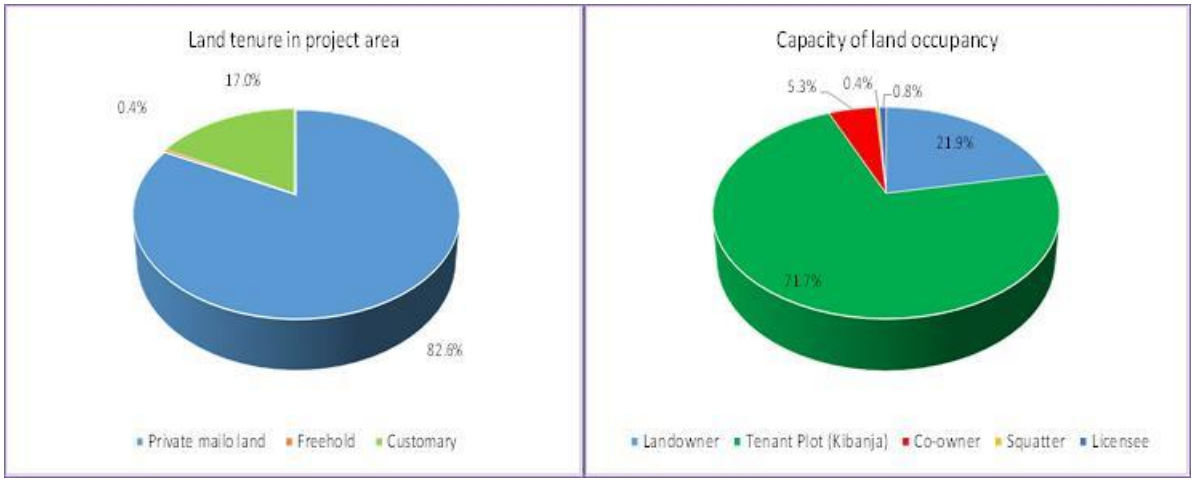


Figure 5-47: Land tenure and capacity of land occupancy within the Project area

Field results pertaining to property ownership (land-in this case), revealed a significant proportion of men (60.4%) were found to own land compared to the women (39.6%) in the project-affected areas. The land owners comprised of 12.9% men and 8.9% female.

Table 5-26 shows that the male-headed households at 43.8% own more Kibanja than females (27.9%). It is important to note that similar to most African settings where women have limited rights of land ownership, the study area only had 36.8% of the women owning land (LO and kibanja) of which only 5% of these had inherited from parents (Table 5-26 and Table 5-27).

Table 5-26: Land ownership by gender.

Gender	Land owners and Gender					Total (%)
	Landowner (%)	Tenant Plot (Kibanja) (%)	Co-owner (%)	Squatter (%)	Licensee (%)	
Male	12.9	43.8	4.9	0.4	0.4	**60.4**
Female	8.9	27.9	0.4	0.0	0.4	**39.6**
Total	**21.9**	**71.7**	**5.3**	**0.4**	**0.8**	**100**

Source: Primary data

Table 5-27: Method of land acquisition

Gender	Method of acquisition			Total (%)
	Bought (%)	**Inherited from parents (%)**	**Renting (%)**	
Male	44.7	13.7	1.9	**60.3**
Female	33.6	5.0	1.1	**39.7**
Total	**78.3**	**18.7**	**3.0**	**100.0**

5.2.2.4 Livelihoods

a) Occupations

The livelihoods for most of the people along the drainage channels entailed retail trade (32.7%), formal employment (13.4%), restaurant services (10.4%), transport (6.5%) and subsistence agriculture (6.9%) and among many sources of occupations as shown in Table 5-28. In relation to those who carried out agriculture in the project area, yams, sugarcane and bananas were the commonly grown crops and these were mainly sold in stalls set up along the road. In addition through observation, a significant number of males had established car washing bays which in the wet lands served as a source of livelihood to them.

Table 5-28: Occupations of project-affected household heads

Main Occupation	Percentage
Subsistence Agriculture	6.9
Retail trade	32.7
Restaurant services	10.4
Formal employment	13.1
Street vendors	2.7
Construction labourers	1.5
Carpenters	1.9
Transport specify	6.5
Public Government	4.2
others	9.2
Not employed	10.9

Source: Primary data

Figure 5-48 and Figure 5-49 to show some of the economic activities in this project area commercial such as food markets, roadside food stalls/kiosks, retail shops, furniture workshops, and car washing bays. Field studies revealed that majority of the car washing bays pump water from the drainage channels for use in their businesses (Figure 5-50). Commercial buildings, shopping malls, schools, industries, fuel depots, fuel stations, vehicle bonds, warehouses and others are all located within the project area.

Figure 5-48: Market along section on Secondary 7

Figure 5-49: Furniture workshops along Secondary 8

Figure 5-50: Water from channel used at car washing bay

b) Income from sources of livelihood

Findings from the study show that majority of those affected by the proposed project are retail traders. The population in the project affected area was involved in a variation of economic activities/livelihoods. When further probed for average monthly income majority of respondents (27.5%) revealed earning UGX 500,001 - 1,000,000 from their respective occupations, with only 15% the respondents earning over UGX 1,500,000 (Table 5-29).

Table 5-29: Average monthly from main occupation among PAPs

Average monthly income	Valid percentage
Below 100,000	6.7
100,001-200,000	10.0
200,001-300,000	10.8
300,001-400,000	7.9
400,001-500,000	7.5

500,001-1,000,000	27.5
1,000,001-1,500,000	14.2
Over 1,500,00	15.4

Source: Primary data

c) Spending Patterns

Table 5-30 show the spending patterns of the respondents. Majority of the people interviewed spent their incomes mainly on school fees (50.9%) and food (36.9%). School fees and medical expenses were also reportedly high due to subscription to private education and healthcare services. Expenditure of food is high in urban areas is high as most of the food items are procured from markets which are close proximity with the homes owing largely to the absence of adequate land for cultivation of food for domestic consumption.

Table 5-30: Spending patterns among affected households

Spending Patterns	Rank*	Percentage
School fees	1	50.9
Healthcare/medical expenses	3	5.8
Food	2	36.9
Transport	6	1.0
Dependants	4	3.8
Rent	5	1.4
Airtime	7	0.3

Source: Primary data (Rank 1= Item most spent on; 10= item least spent income on)*

5.2.2.5 Ethnicity and Religion

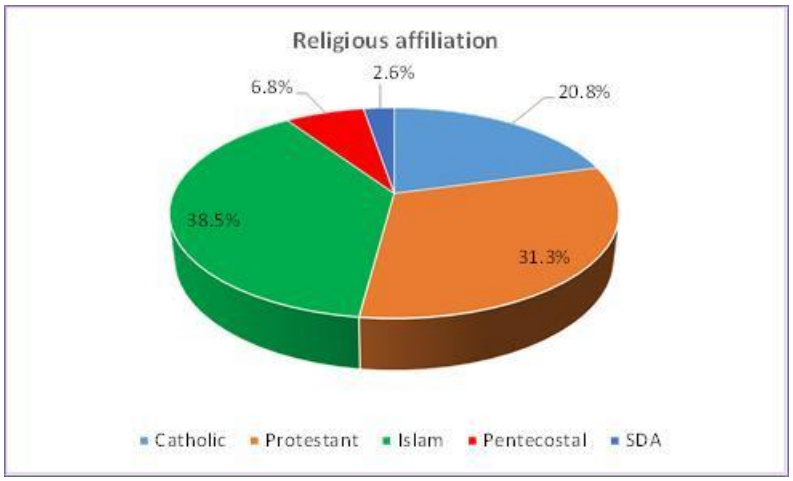
Tribal affiliation in project area is very heterogeneous. However, the project area was predominantly inhabited by mainly Baganda (87.6%), Basoga (2.6%), and Banyankole (2.2%). The other tribes encountered were Bagisu, Baluli, Itesot, Kakwa, Langi, Samia as well as other nationalities such as Rwandese and Indians. Table 5-31 shows the various tribes in the project area.

Table 5-31: Tribal Affiliation in the project affected area

Tribe	Valid Percentage
Baganda	87.6
Banyankole	2.2
Bakiga	0.7
Banyoro	1.5
Basoga	2.6
Alur	1.1
Lugbara	0.4
Others	3.7
Total	100.0

Source: Primary data

In the project affected villages in Kampala district, the biggest number of PAPs in households surveyed were Muslims (38.5 %) followed by Protestants (31.3%), Catholics (20.8%), and Seventh Day Adventist (SDA) (2.6%).



Source: Primary data

Figure 5-51: Religion among PAPs in project area.

5.2.2.6 Health and Sanitation

a) Prevalent diseases

Prevalent diseases among people in the Project area were malaria (89.4%); venereal diseases (4.0%) and respiratory diseases such as cough, asthma and flu cough (3.2%) as summarized in Table 5-32. More so, further interrogation on disease burden during to the focus discussions some respondents revealed the endemic poor healthcare services and inadequate drugs in the health centres. Malaria and respiratory infection were mainly common among children. Respondents also reported occasional outbreaks of typhoid (3.4%) and other gastrointestinal diseases.

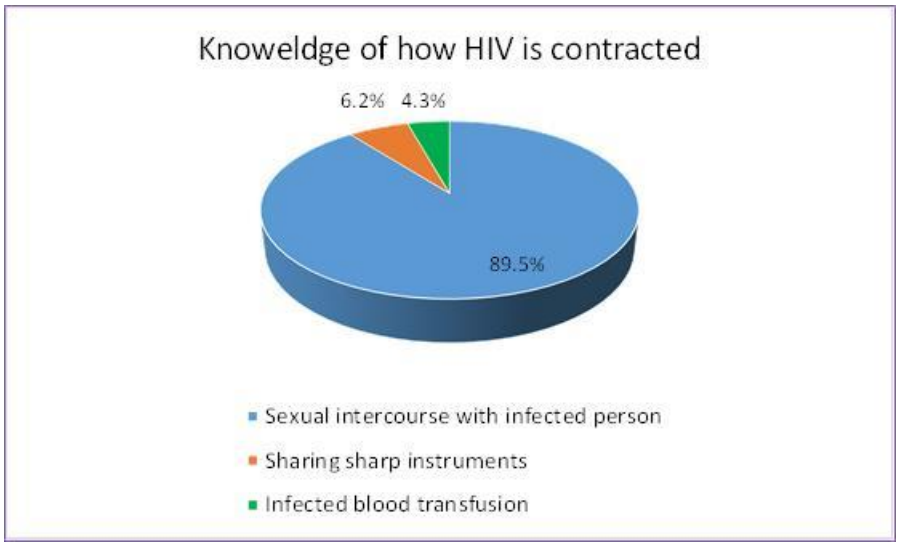
Table 5-32: Most common diseases reported in the affected household

Most common diseases	Percentage (%)
Malaria	89.4
Venereal disease	4
Respiratory	3.2
Typhoid	3.4

Source: Primary data

b) Knowledge of HIV/AIDS

All the respondents knew about the prevalence of HIV/AIDS and how it is transmitted. All the PAPs knew the different ways in which one can contract HIV/AIDS as highlighted in Figure 5-52.



Source: Primary data

Figure 5-52: Knowledge of how HIV is contracted

c) Spending on health

Malaria is the commonest disease and 89.4% of the surveyed households spend various amounts on treating it throughout the year as shown in Table 5-33.

Table 5-33: Amount spent on most common disease

Disease	**Annual expenditure on most common diseases(UgShs)**				**Total**
	Below 10,000/=	**11,000 – 20,000/=**	**20,000 – 30,000/=**	**Above 30,000/=**	
Malaria	20	11.3	24.1	34	89.4
Respiratory diseases	0.4	1.6	0	1.2	3.2
Venereal diseases	0	0	2	2	4
Typhoid	0	0	1.4	2	3.4
Total	**20.4**	**12.9**	**27.5**	**39.2**	**100**

Source: Primary data

5.2.2.7 Sources of water in project area

Table 5-34 shows that in the project area, within the project affected households, the commonest sources of water for domestic use are piped water (50.2%), protected spring (26.4%), shallow well (10.2%) and community borehole (9.4%). Access to clean potable water in most of the project area demonstrates the effort and success of extending water services to the communities.

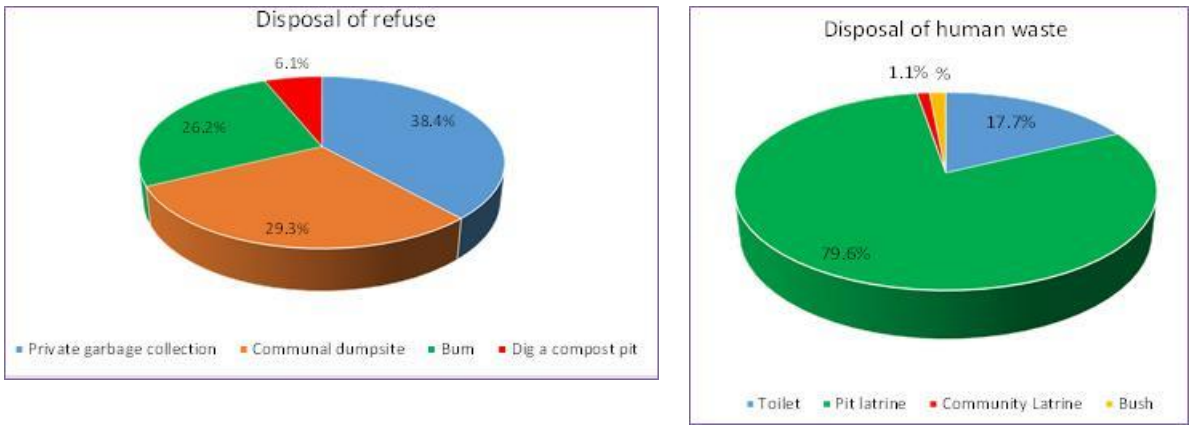
Table 5-34: Type of water source and distance

Source of water	**Percentage**
Communal borehole	9.4
Protected spring	26.4
Unprotected spring	3.0
Stream	0.4
Shallow well	10.2
Piped water	50.2
Rain water	0.4

Source: Primary data

5.2.2.8 Waste management

Figure 5-53 presents the various ways in which waste is managed in the Project area. Domestic refuse was mainly disposed of using private garbage collectors (38.4%) communal dump site (29.3%) and Burning of refuse (26.2%). A small percentage of the respondents dug a compost pit to dispose of refuse (6.1%).



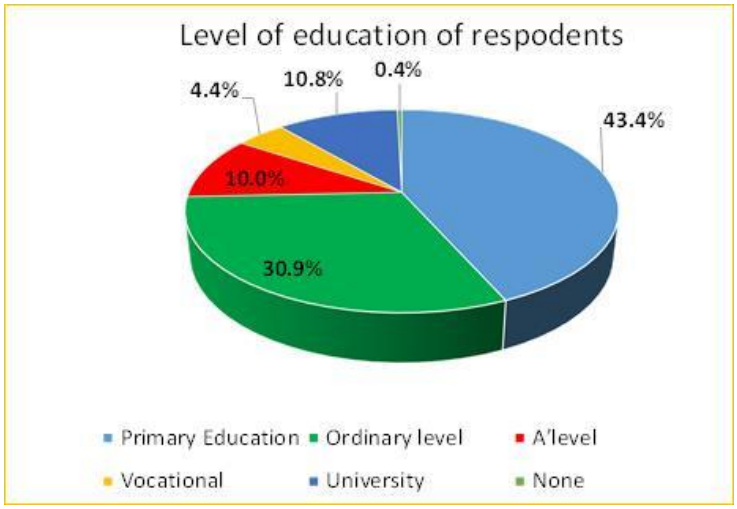
Source: Primary data

Figure 5-53: Disposal of refuse (L) and human waste (R)

On disposal of human waste, most respondents used toilets (79.6%), pit latrines (17.7%) and community latrines. However some respondents revealed using the bush (1.1%) for human waste disposal. This poses a great danger to the health status of the community and the environment in general as it may lead contamination of water sources such as springs and wells leading to the spread of oral faecal diseases such as typhoid and cholera.

5.2.2.9 Level of Education

Education is a major socio-economic aspect which influences nearly every aspect of human life and socio-economic development. Field results of education level of respondent as shown in Figure 5-54 reveal that the majority (43.4%) of respondents had attained primary education and only 10.8% had attained university education. Generally there is widespread literacy within the project affected households. This means that the vast majority of the PAPs can provide skilled and unskilled labour to the project if it is available.



Source: Primary data

Figure 5-54: Education levels of House hold heads

5.1.1.1 Energy Sources

In the project affected areas primary data reveals that there is increased access and use grid electricity (76.2%) as a source of energy for lighting and charcoal was the main source of cooking energy (79.5%) together with firewood (16.0%). Fuel sources in affected household in project area are shown in Table 5-35.

Table 5-35: Fuel sources used in the Project area

Source of fuel	Lighting purposes (%)	Cooking purposes (%)
Firewood	0.8	16.0
Charcoal	0.4	79.5
Solar	3.0	0.0
Kerosene	17.7	1.9
Electricity	76.2	1.1
Gas	0.0	1.5
Other(candles)	1.9	0.0

6 STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATIONS

6.1 Objectives of Consultation and Disclosure

The objectives of consultations during the ESIA process were to share Project information with a wide range of stakeholders, to obtain baseline information, and to allow stakeholders the opportunity to make comments and express their views on the proposed Project's impacts and mitigation measures being proposed to address these impacts. It will be important to share the Project benefits and adverse impacts, as well as the proposed enhancement and mitigation measures. Information to be disclosed will include details of the purpose, nature, location and duration of Project activities.

Stakeholder engagement constituted an important part of the Scoping Phase, in light of the Project's commitment to adhering to national requirements, as well as a best practice approach to public consultation, *i.e.* an approach that encourages open and transparent dialogue, with as broad a range of stakeholder groups as possible. The broad aims of these consultations were to:

- Provide timely and transparent information on the Project to relevant stakeholders at an early stage in the project lifecycle;
- Provide a preliminary opportunity for stakeholders to give their feedback on the Project; and
- Ensure that the Scoping Report and the ToR take into account stakeholder views.

The more specific objectives of the scoping consultations were to:

- Consult with key strategic stakeholders on specific issues of interest / concern to them;
- Identify other potential key stakeholders; and
- Obtain preliminary baseline data.

6.2 Key Issues Emerging from Consultations

Consultations with the stakeholders met as listed in Section 3.3, were held between August 2015 and March 2016. Some of the key issues/ expectations raised during the consultations are summarised in (Table 6-1).

Table 6-1: Summary of key issues from the consultation meetings

Stakeholder	Key issues
Directorate of Water Resources Management (DWRM), Ministry of Water and Environment	The causes of flooding should be carefully studied such that the solutions proposed by the design team are actually effective for the long term. In the past, channels have been widened in some places with no reduction of the flooding problem in the area. The ESIA study should clearly state that bare ground in the catchment areas is a major problem as it greatly contributes to siltation / sedimentation. Recommendations can include policy changes to encourage increasing green / vegetation cover, and improving waste management.
	The Kampala drainage system impacts on the ecosystem should be exhaustively investigated during the study. The status of the receiving wetlands should be considered because previously, the impacts of Greater Kampala Metropolitan drainage channels on receiving water bodies have not been carefully assessed. Case in point is the Nakivubo Channel that has greatly contributed to the pollution of the Murchison Bay on Lake Victoria.
	The Project does not have any statutory requirements, unless inter-catchment transfer structures are to be constructed. Construction of hydraulic structures requires a permit. If water abstraction for construction works has to be done, permits will have to be

Stakeholder	Key issues
	acquired.
National Water and Sewerage Corporation (NWSC)	Sewerage systems share the same profiles as drainage systems. Thus some of the intended channels are located where NWSC has existing infrastructure and has already compensated the communities. To avoid double compensation KCCA should work with NWSC to share the implemented compensation database.
	KCCA drainage project needs to take into account NWSC sanitation plan for the existing and planned systems.
	If any of the existing NWSC infrastructures must be relocated, KCCA will be responsible, but should work with NWSC.
Buganda Land Board (BLB)	The design of the current drainage channels might not necessarily be the problem with the system. The garbage disposal problem in the City is a major problem and until this is solved, the flooding problem will continue.
	Serious consideration should be accorded to land tenure matters during the compensation e.g. 50 year lease versus 3 years left on the lease. These should be handled specific to the lease. When the lease expires, the land reverts to the kibanja status.
	Government compulsory acquisition does not give the land owner the option to refuse to give up their land for the Project. The Buganda Land Board will not stand in the way of development, for the public good.
	What is the Buganda Land Board role with people with sales agreements?
	The Buganda Land Board (BLB) is the only organisation with the mandate to verify land ownership on Kabaka's Land. 'Baami ba Kabaka' are only delegated by the Board.
	Strip maps from the Project should be passed on to the BLB for registration. This will involve identifying those who have registered with the shs. 600,000 and those who have not. In addition, people with land titles sometimes have arrears with their ground rent and these should also be verified through the BLB.
	The BLB has a survey unit that should be involved in the Project's surveying and valuation work.
	Special consideration should be made for large entities such as BLB.
	The BLB has land titles for vast pieces of land. One company took land titles from the BLB in 2005 for the Northern Bypass and is still holding them to date. The titles should not be taken by Government. Instead, mutation forms and photocopies of the land titles should suffice for the purposes of this Project.
Wetlands Management Department (WMD), Ministry of Water and Environment (MWE)	KCCA needs to liaise with Ministry of Lands to go about the issue of resettlement from wetlands.
	The problems with the drainage system in Kampala are beyond Engineering solutions only. A wholesome solution needs to be used in order of solve the problem.
	The disposal of silt from the channels is also a big challenge. A NEMA-approved dump site needs to be approved for use.
	Wider channels have the implication that more water will be poured into water bodies untreated. The wetland sections should be enhanced and lagoons built to enhance the waste treatment before discharge into the receiving water bodies such as Lake Victoria.
	Resettlement of areas within industrial parks will be difficult.

Stakeholder	Key issues
Office of the Chief Government Valuer (CGV)	Establish communication links with key stakeholders like NEMA, KCCA, and Buganda Land Board among others.
	Work schedule should be made so we can measure performance.
	There is urgent need to seek clarification with KCCA and NEMA if they have some gazetted corridors and if they will be considered for compensation.
	Disturbance allowance of 30% is to be considered since KCCA wants to start the Project as soon as possible.
	Seasonal crops should be included in the assessment since there is limited time to carry out the land acquisition and compensation.
Occupational Safety and Health (OSH) Department , Ministry of Gender, Labour and Social Development (MGLSD)	The Project policy and tender documents prepared for consultants and contractors should clearly state the responsible parties for the implementation of the mitigation measures.
	Committees for ensuring the implementation of health and safety measures should be in place, during both construction and operation phases.
	The Project should prepare an OSH policy for both construction and operation phases, which should include an HIV/AIDS policy.
	Instead of recommending PPE in the ESMP, emphasis should be put on developing an OSH programme. MoGLSD should be listed in the ESMP as one of the responsible agencies for supervising the implementation of the ESMP.
	Improved health and safety should be expounded on as a positive impact because this Project will definitely improve the health situation in the Project areas by reducing on the risk of outbreak of water borne diseases.
	To ensure success of this Project, the community involvement component must be clearly indicated. The communities should be made to appreciate the Project so that they contribute towards the maintenance of the channels. This will involve improved solid waste management practices.
	Stakeholder involvement should be provided for in project implementation, during both construction, and operation and maintenance phases.
	KCCA needs to have a **s**anitation programme and Public health component so as to improve the Solid waste management within the City.
	National Water and Sewerage Corporation has a pro-poor project. They should work together with KCCA.
Division Leaders (Town Clerk's Office, Councillors, Local Council Chairpersons) Kawempe Division Makindye Division Lubaga Division Nakawa Division Central Division Wakiso District	Project Design
	How wide is the channel?
	Where exactly will the channels pass? What are the start and end points?
	Regarding the channel design width, where does 3 m start? Width of channel has not been very clearly stipulated.
	Access roads should be a must. They are very necessary for collection of the desilted waste from channels, as well as garbage collection.
	When does construction start?
	Rails for safety, especially for children, should be incorporated into the designs.
	Involvement of local area leaders in Project

Stakeholder	Key issues
	How will the local area leaders be involved in the Project?
	Will the local area leaders be given any allowance or facilitation?
	In other projects, the PDC is usually integrated into the project to ensure that the work is executed in a manner that the community embraces. The PDCs should therefore be involved in this project.
	RAP Study
	Some residents have reported seeing surveyors going through their land and the communities. The local area leaders should have been informed prior to any field studies.
	How will the title holder, Kibanja owner and tenant be paid?
	The Buganda Land Board should be consulted, as a major land owner in the area, and also included on the Grievance Committee.
	Should people carry on with their developments e.g. planting trees, crops, buildings etc.?
	What if the Project is delayed after the RAP process is finalized?
	How will the Project proceed if there are land wrangles in some sections?
	Should people continue to register their land with Buganda Land Board?
Community members in Project Area (FAQs)	Project Design and Timelines
	When will the Project start exactly because some people passed through?
	How far from the current channel will the new channel extend?
	Will tertiary channels also be worked on?
	Will this project actually be implemented? The example of Bwaise channel in Lubigi was implemented but is not being maintained. Won't this same problem affect these proposed channels?
	Will all the channels be worked on in this project?
	Is it possible for the channel width to be reduced from the 14m to at least 10m?
	The local leaders in the area are not properly informing the people about the Project. The people need proper notice so that everyone can be properly prepared.
	People in Wetlands
	Most people are within wetlands. Will these be compensated?
	NEMA identified people in the area within wetlands and those are recognized. Those who built afterwards will not be recognized. Is this the case?
	Will the project consultants be working with NEMA? Considering that people are in wetlands.
	It is possible that there could be delays in the project, as opposed to doing the valuation and taking up to 5 years without implementing.
	RAP and Compensation
	KCCA usually demolishes people's infrastructure without notice or compensation. What guarantee do people have that this Project will be any different?
	Most of this area is on Kabaka's land. How will these be catered for since people have just finished paying for their tenancy at the Buganda Land Board?

Stakeholder	Key issues
	Most land purchases are done with agreements. Will these also be paid for?
	What happens if a landowner passed away?
	During valuation work, the PAPs are not told the amount they will be compensated. Is it that the structures will be demolished before the compensation payment has been made?
	The brochure talks about land titles and landowners. What about individuals with no land titles, but only agreements?
	How will schools be dealt with, especially if the time/ notice is short?
	Will structures be paid based on what will be affected for example if a veranda is within the project corridor, will the entire house be compensated?
	Plots with no developments, how are they going to be catered for?
	What happens if the space left after the Project affected area is very small?
	Will people be paid first before they are asked to leave?
	How wide will the access be?
	In which category do leaseholders fall?
	What happens if someone is not in the Project area but their structures are to be affected?
	Identification before payment is crucial. Some Projects have people being paid when they are not the legitimate owners.
	In this area, there was no channel in existence. People created the channel to create relief to flooding; will those who invested in lining the channels be compensated? Most people in the area lined the sections of the channels near their homes.

Similar comments were received from majority of the stakeholders. Most feedback from the dicussions with Institutions, Local area leaders, and community members could be categorized as related to Project design and timing, land acquisition and compensation, maintenance of the channels during operation, particularly management of solid waste and de-silting, and job opportunities. Table 6-2 provides a summary to the responses to the Frequently Asked Questions (FAQs) from Stakeholders, and how the various concerns were incorporated into the Project, to ensure that stakeholders' concerns are adequately addressed.

Table 6-2: Summary of responses to FAQs from Stakeholders

Aspect	Response	Adoption into Project
Project design and timing	Channelization is not the only option being considered. Other options include use of retention ponds (within the channel or in upper reaches of individual catchments), and inter-catchment transfer.	Project alternatives during Project design considered the various options to eventually choose the best combination of options
	This project is restricted to the primary and secondary channels, but facilities will be provided for inlets into the channels within the 3 m access roads required on both sides.	This was restricted by the Project scope.
	Construction phase is planned to start in mid-2016, with the Project phased to last about five (05) years.	Timelines were variable and KCCA could not start within planned time.

Aspect	Response	Adoption into Project
	The Design Engineers will not compromise on the effectiveness of the channels. However, the Engineers are doing whatever is possible to minimize the land take requirements of the Project.	Project alternatives during Project design considered the various options to eventually choose the best combination of options
Land acquisition and compensation	The valuation surveyors will be contracted by KCCA, the Project developer. However, the rates estimated by the valuation surveyors are submitted to the Chief Government Valuer (CGV) for approval; so government is involved in the project.	Considered in RAP process
	This is a World Bank Project and therefore World Bank Guidelines will be followed. The WB Guidelines stipulate that all people affected persons are compensated, according to their ownership status.	Considered in RAP process
	Different rates for land owners, kibanja holders, and tenants will apply. The kibanja owner gets 70% of the value since they are the ones occupying the land; title owner gets 30% of the value. The tenants get compensation for the equivalent of their losses from the land, for example costs for loss of income as they find alternative tenantable land on which to carry out their economic activities.	Considered in RAP process
	The World Bank Guidelines emphasise that present day value of assets is used during valuation. The market value of building materials will be used, while current district rates for Kampala district will be used for agricultural possessions such as trees and crops.	Considered in RAP process
	There will be a Grievance Committee to try and settle any disputes of aggrieved project affected people? However, the entire Project will not be stalled on account of a few individuals. An example is the construction of the Northern bypass which started and skipped over the sections with unresolved land issues.	Grievance Management Process recommended in the ESIA/ ESMMP.
Maintenance of the channels during operation, particularly management of solid waste and de-silting	Dredging of silt is part of a channel's maintenance during operation. One of the challenges to this exercise with the current channels has been lack of access to transport away the dredged material. Once this Project is implemented, it will be easier to dredge the channels of silt.	Provision for access roads made during Project design because if concern on poor maintenance of existing channels.
	KCCA will have to take a multifaceted approach to solve the City's flooding problem. Currently, some urban division councils are taking on garbage collection contractors to manage the solid waste. Such steps will go a long way in contribution to the flooding solution.	Commitments made in ESMMP to improve the City's waste management.

Aspect	Response	Adoption into Project
Job opportunities	Community members interested in getting jobs will have to be proactive and approach the Project Contractors when these are commissioned to start work. The ESIA report has made a recommendation for KCCA to oblige any contractors of the Project to hire the local community members to the extent of the available skill available, especially for unskilled labour.	Commitments made in ESMMP to allow for local recruitment, while also providing for stringent measures against gender-based violence, violence against children andchild labour in the ESMMP.

6.3 Disclosure of Environmental Impact Statement and Public Hearing

Public Disclosure

NEMA, to whom the Environmental and Social Impact Statement is submitted for review and approval, is also responsible for disclosure of the report in public libraries and at Division headquarters of Kampala District where the Project is located. The Environmental Impact Statement shall also be placed on the Proponents website for review and comments.

Public Hearings

According to Uganda's EIA Regulations, calling and conducting public hearings is a mandate of NEMA. If NEMA considers it necessary to obtain more public views about the project, it shall together with KCCA, organise and conduct public hearings on dates and locations that would be publicised in the media.

7 ASSESSMENT OF IDENTIFIED ENVIRONMENTAL AND SOCIAL IMPACTS

This section presents an in-depth assessment of the potential impacts during both the construction, and operation and maintenance (O&M) phases of the Project. Enhancement measures for the positive impacts that are presented augment the Project's benefits while mitigation measures are presented to avoid, minimize/reduce, or compensate/offset the identified adverse impacts.

The positive impacts described will be benefits seen throughout the life of the Project. While majority of the positive impacts will be realised during the O&M phase, a few will be short term, only lasting the duration of the two year construction period. The short term negative impacts have been assessed to last for the duration of the two year construction phase. A few of the impacts could also be evident during the O&M phase.

Residual impacts after the application of the mitigation measures will also be assessed to be sure they are at most minor else measures will be put in place to continually address these during the O&M phase of the Project.

PRE-CONSTRUCTION PHASE

7.1 Impact on socio-economic environment

7.1.1 Negative Impacts

7.1.1.1 Land Take / Involuntary Resettlement

The improvement of priority drainage systems in Kampala will require increasing the channels' width and re-alignment of the channels in some sections. The Project requires increasing the channel width in order to alleviate the flooding problem. The Uganda Road Design Manual requirement for a 3 m access road on both sides of the channels is to be implemented for this Project, further increasing the corridor widths. The access roads are important for delivery of construction material during the construction period and for movement of maintenance trucks during the O&M phase. Channels, where necessary, will be re-aligned to better improve the conveyance of stormwater and minimize the potential for bottlenecks in the systems that contribute to the flooding problem. This will result in land take and involuntary resettlement, since people's land will be required and property lost as a result of the Project implementation.

Thus, about 3000 households' property will be affected by the Project implementation, especially in the densely populated slum areas such as Mulago Katanga, Makerere Kikoni, and Bwaise Kisenyi where very many residential houses are built along the channel lengths. Figure 7-1 shows an example of the characteristic situation in the dense slum areas within the Project area where properties are developed along the channels and another classic example of wall fences marking the edge of the channels. Figure 7-2 shows some of the structures identified by the Project's RAP process to be affected, which aside from residential structures also include schools, clinics, churches and mosques.

The Land Act, as detailed in Section 4.2.3, provides that PAPs be compensated before they are asked to leave the Project area. This Project compensation process will be conducted in line with the Uganda law requirements and the World Banks OP 4.12.

Figure 7-1: Example of a densely populated channel section (L) and wall fence on channel edge (R) within the Project area

Innerman Pre & Primary School
0450968N 0037021E
Kiwunya (Sec 6, Lubigi)

The Amen Commission Church
0450973N 0037016E
Kiwunya (Sec 6, Lubigi)

Mosque
0450713N 0038113E
Kiwunya (Sec 6, Lubigi)

Soul Winning Church

Nakamiro (Sec 7, Lubigi)

Prosper Primary School
Nakamiro (Sec 7, Lubigi)

Morning Star Clinic
0450973N 0037016, Kiwunya (Sec 6, Lubigi)

Figure 7-2: Examples of structures to be affected by the Project

This impact will be long term, since the affected people will be compensated and asked to relocate before the start of the Project construction activities. However, this process has to be carefully managed because the magnitude of the impact is high considering the scope of this Project. The compensated people will have to be strongly warned against encroaching on wetlands in other parts of the City.

Impact Significance

The likelihood of this impact occurring is high considering the proximity of the building structures to the drainage channels. The proximity implies that a large number of properties along the channels will be affected by the project implementation. In some instances, housing structures are so close to the channel edge that there is almost no distinction between the channel edge and the house foundation. In the Kinawataka and Kansanga catchments, it was commonplace to find wall fences of housing structures marking the edges of the channels.

The severity of the impact is also high because of the dense population along some of the channels within this Project. All the three drainage catchments/systems within the Project area have sections that are densely populated, with varying degrees in terms of the quality of housing infrastructure to be affected. The Lubigi catchment (Secondary channels 7, 8 and 9 in Kawempe Division and Secondary 3 in Lubaga Division) is mostly characterised by slum developments within the Project area; Kinawataka Catchment has industrial properties and upper middle-class residential houses; and Kansanga and Gaba majorly middle-class residential houses. Therefore the impact significance is assessed as major.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) All efforts will be made to avoid loss of structures especilly by optimising the re-alignment options for the least PAPs undertaken in consultation with the affected people.

ii) A Resettlement Action Plan will be developed to guide the compensation and resettlement process in line with Ugandan laws. The Plan will also be developed in accordance with World Bank OP 4.12 for Involuntary Resettlement. In the event of land disputes, no works will be undertaken in such areas until disputes are resolved.

iii) Timely sensitizations and consultations with affected persons will be done. The process of consultations and sensitizations was started in October 2015 and will continue until all affected communities and persons have been engaged.

iv) In line with World Bank OP 4.12, a Grievance Mechanism was developed and appended in Vol. 2: Appendices, that will guide any unsatisfied or disgruntled persons during or after the compensation process, as a measure to minimize the severity of the impact of involuntary resettlement.

v) KCCA, as the Project developer, will provide adequate and fair compensation (as approved by the Chief Government Valuer) to the project affected persons, before the commencement of Project activities.

vi) Clear guidelines will be developed to assist any affected community members identfied as vulnerable during the RAP process.

vii) Sufficient forewarning to communities in villages in the Project area of specific dates when activities will take place and regular updates of any changes will be undertaken.

viii) The Supervising Consultant shall ensure that land take is made only in vanquished wetlands[3] and any design review possible does not cause exension of the existing extent of works into intact wetland systems.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.1.1.2 Disruption of normal routine

Considering the land take requirements of this Project, and the required RAP process in line with the World Bank's OP 4.12 that involves sensitization meetings, survey and valuation, census surveys, among other procedures; people in the Project area get disrupted from their daily routine in order to participate in the process. Some of the activities such as community sensitizations and socio-economic surveys are not restricted to PAPs, but involve people generally within the Project area.


Figure 7-3: Community members attending sensitization meetings

Impact Significance

The likelihood of impact occurring is high because the various meetings have to be held in order to understand potential impacts, get feedback regarding workable mitigation measures, as well as ensure that the RAP process is fully understood by all the people concerned.

The impact severity is negligible because the disruption will very short term. Meetings are held for between 1 and 2 hours, and are pre-arranged by the local area chairpersons. The surveying and valuation work is also not very time consuming for the affected people. Therefore the impact significance is negligible.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

[3] *The Technical Working Group of the Policy Committee on Environment proposed through the Cabinet Minute 114 (CT 2014) cancellation of land titles in wetlands on public land acquired unlawfully after 1995 to address wetland degradation. However, TWG also proposed that some wetlands be declared "**Vanquished**" and that land titles therein should not be cancelled. The TWG proposed guiding principles for deciding on whether the wetland is vanquished and among other, they (the TWG) suggest that for a wetland to be declared vanquished, it should be providing essential goods and services for public good including waterworks, wastewater treatment facilities, ports, marinas, roads/bridges and electricity power lines.*

Mitigation measures

i) The people targeted to attend community meetings will be given adequate notice so that they can plan their activities appropriately.

ii) The surveyors and valuers will give ample notice regarding the times and dates in which they will be in a given location within the Project area, so that people of interest are aware of the progress, and are available at the time.

iii) The meetings will be held in locations that are easily accessible and close to the targeted community members so that the least inconvenience is subjected.

7.1.1.3 Economic Displacement

The land take impact associated with the implementation of this Project will also result in economic displacement in areas where economic activities are being conducted along the channel lengths (Section 5.2.2.2). A number of small food markets, kiosks, nursery beds, car washing bays, among other activities were identified as likely to be affected. Some schools, especially nursery and primary schools (Figure 7-2) will also be affected by the project implementation.

Impact Significance

The likelihood of this impact occurring is high considering the proximity of most of the identified economic activities to the drainage channels.

The severity of the impact is assessed as medium because the business owners will be compensated, and given a notice period to vacate before the project construction can be started. The compensation will be done in line with the laws of Uganda and the World Bank OP 4.12 for involuntary resettlement. In addition, the nature of the identified economic activities is such that they can easily thrive in many other locations within the City.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) All efforts will be made to avoid economic displacement especially by optimising the re-alignment options for the least PAPs undertaken in consultation with the affected people.

ii) A Resettlement Action Plan will be developed to guide the compensation and resettlement process in line with Ugandan laws. The Plan will also be developed in accordance with World Bank OP 4.12 for Involuntary Resettlement. This Plan will take into consideration the compensation for economic displacement.

iii) Timely sensitizations and consultations with affected persons will be done, putting into considerations owners of businesses within the Project area. The process of consultations and sensitizations was started in October 2015 and will continue until all affected communities and persons have been engaged.

iv) In line with World Bank OP 4.12, a Grievance Mechanism (Appendix D; Volume 2; Appendices) was developed that will guide any unsatisfied or disgruntled persons during or

after the compensation process, as a measure to minimize the severity of the impact of involuntary resettlement, in particular those whose businesses will be affected.

v) KCCA, as the Project developer, will provide adequate and fair compensation (as approved by the Chief Government Valuer) to the project affected persons whose sources of income are directly affected by the Project, before the commencement of Project activities.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

CONSTRUCTION PHASE

7.2 Impact on socio-economic environment

7.2.1 Positive Impacts

7.2.1.1 Income to material / equipment suppliers and contractors

Construction and upgrade of the road and drainage structures will require materials such as gravel, aggregate, sand, murram, asphalt, and Portland cement. This presents financial benefit for local and foreign suppliers; a short-term but significant socio-economic benefit.

Enhancement measure:

The Contractors and sub-contractors will purchase materials from licenced quarry sites, to reduce environmental degradation as a result of the project implementation.

7.2.1.2 Employment and Skills Training

Construction of the drainage systems will avail over 500 skilled and unskilled job opportunities, especially to the youths in the area who need the employment. Skilled personnel will be employed as Managers, Supervisors, and Technical Personnel whereas unskilled labourers will be support staff and perform non-technical work. The income accruing from the placement will contribute to their improved standards of living.

The magnitude, complexity and required quality of the Project requires bidding by both international and local contractors. The international contractors will be encouraged to support local contractors by giving them work as subcontractors.

This would be a positive but short-term and reversible impact, lasting only during the construction period. However, some youths in the areas along the channel could be kept on for maintenance works on the channels, such as slashing overgrown vegetation and cleaning garbage out of the channel. In addition, the Project will present an opportunity to train Ugandans and enhance the skills of KCCA staff in various fields such as Engineering, Surveying, Project Management, as well as artisans such as masons, and mechanics.

Enhancement measures:

i) KCCA will require the contractors to use locally available labour, to the extent possible, depending on the level of skill required vis à vis what is available. This will have the advantage of endearing the local communities to the project and further encourage the community to take responsibility in the maintenance of the project infrastructure, especially channel crossings, as well as vigilance against garbage dumping in the channels.

ii) Contractors will be encouraged to pay a 'living wage' to all workers involved in Project implementation.

iii) The Contractors will be obligated to work within Uganda's labour laws (Employment Act), including restrictions on child labour especially where it can interfere with the child's education.

iv) It will also be important to manage community expectations regarding employment opportunities to minimize the potential for community tensions and dissatisfaction.

7.2.1.3 Benefit to local retail businesses

This Project will have construction works on-going for an estimated period of two (02) years in four (04) divisions in Kampala district. The construction workers on this Project will need food stuffs, drinks and other assorted items which they will be able to purchase from nearby retail shops. This will be of economic benefit to the local retail businesses. Another potential source of income for the local proprietors is provision of local accommodation for the contractors' workforce.

Enhancement measures:

i) Contractors and subcontractors will encourage their workers to support businesses that conduct their businesses in line with national laws and KCCA bylaws and regulations. Quality and safety of products will be advocated for amongst local businesses as this will have the overall effect of improving the standards of the local businesses.

ii) During the sensitization meetings with local communities, the local residents need to be informed about the Project and how their businesses can benefit from the Project.

iii) KCCA, through the respective Division offices, will monitor the local businesses with the aim of encouraging the local retail business owners to supply the Project workers with the requisite products, in line with their businesses.

7.2.1.4 Improvement of other Service Infrastructure

A number of service infrastructures such as water pipes and communication cables that run along or across some sections of the channels (Figure 7-4) will have to be removed and replaced during Project implementation. Some of the water pipes were routed through the drainage channels which also convey domestic wastewater, thus presenting a risk of water contamination in the event of pipe leaks (Section 2.3). This Project provides the opportunity to install such service connections in a manner that minimises the eminent risk of water contamination, for example along culvert crossings or bridges.

Figure 7-4: Water pipes running through sections of drainage channels

Enhancement measures:

i) Rectification installation of the service infrastructure that intersects with the drainage channels to be upgraded should be planned to take the shortest time possible to minimise disruption of service for the users' communities.

ii) Conduits for future service infrastructure projects will be budgeted for and included in the Project construction scope, for example at culvert road crossings and channel crossings. This

will make it possible for service providers to install infrastructure without damaging the drainage infrastructure, or causing potential bottlenecks in the drainage system.

7.2.2 Negative Impacts

7.2.2.1 Flooding due to Construction Works /Channel Diversions

A key activity during the construction works for improvement of the drainage system is to manage or temporarily divert the base flow within the channels. Residents along the channels might suffer from more intense flooding than usual during the construction phase because of restrictions in various parts of the system. Depending on the phasing of the construction works, the method of construction, and the timing of the works, there is a risk of water diversion causing floods. The impact is likely to be even more severe during the rainy seasons when flooding takes place in the Project areas even without construction works in place.

Impact Significance

The likelihood of occurrence is high especially if the construction works coincide with the rainy/wet seasons.

The severity of the impact would be high if flooding occurred as a result of Project implementation. Flooding results in a number of adverse impacts such as property and infrastructure destruction, and fatalities in rare instances. Therefore the impact significance is major.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) The phasing of construction works will be such that the majority of works are undertaken during the dry season to reduce the risk of constrictions in the drainage system during the rainy season. Construction will not be started where critical access roads or channel sections cannot be completed before the start of rainy season and the bidding documents shall reflect this emphasis.

ii) The Contractors will use best available methods of construction to minimize the risk of blocakges and constrictions during construction. Some of the methods that can be employed for channel diversion include: a) controlled release of flow through a pipe to downsteam of the section under construction after daming; b) restrictiong of the flow to one proportion of the flow channel area as construction is completed in the other flow area.

Adoption of the above mitigation measures will reduce impact severity to “low” level resulting in a residual impact of minor significance.

7.2.2.2 Occupational and Community Health and Safety Risks

7.2.2.2.1 Sanitation Risk

Most sections of the secondary channels traverse residential areas. Some residential areas are very densely populated, for example secondary channels 3, 7, 8, and 9 (locally named Nabisasiro, Nakamiro, Katanga, and Kiyanja, respectively) in Lubigi Catchment pass through slum areas in Kosovo, Makerere-Kikoni, Bwaise, Kawempe, Mulago, and Kyebando. In addition to the dense population, these areas are located majorly within the flood plains and as a result, often report heavy and frequent flooding. This observation is consistent with UN-HABITAT, in a 2007 situation analysis

on slums, which reported that over 60% of Kampala residents stay in slums, characterized by poor sanitation, high disease incidence and frequent epidemics. While the statistics might have changed over the last eight (8) years, the picture presented by the report is still valid and representative.

This Project will require widening of the channel corridor, by up to six (6) times in some cases especially considering the proposed access roads for channel maintenance. Such expansion will require demolition of structures along the existing channel corridor, which process is likely to have an impact on community health and safety. This will majorly be because of the already existing fragile sanitation system where pit latrines and bathrooms are lined along the channel edges (Figure 7-5) and in most cases are emptied into the channels during rainfall events. This implies that the channels convey both storm water and sewage. More safety hazards could arise from excavations at the local community crossing points which could result in injuries and/or fatalities to the members of the local population. This impact could be exerbated by lack of light to guide unsuspecting people walking through the excavated sites. Further discussion of safety related aspects is referred to in sub section 7.2.2.2.2 of this report. Community health problems could arise from the fact that both the construction workers and community members will be exposed to the sewage from the channels and sludge from pit latrines during the construction phase.

Since the pit latrine sludge that has to be disposed of is contaminated and a health harzard, the OHS risk for the construction workers could be high. In addition, the pit latrine sludge washed downstream beyond the construction sites by flows in the channels poses a health risk to downstream residents and an environmnetal concern to the receiving ecosystem.

Figure 7-5: Latrines lining the channel (L) and raw sewage released into channel (R), typical of most densely populated areas

Another factor to consider is what the affected residents will use for sanitary purposes when the pit latrines and bathrooms along the channels are removed to allow for Project implementation. Additionally many house do not have enough land acreage for replacement pit latrines when the existing pits are demolished. Further more, being a line Project whose implementation will be phased; the disposal of the construction workers' excreta could also pose a challenge.

Impact Significance

The likelihood of this impact occurring is high considering the proximity of the sanitation facilities (latrines and bathrooms) to the channels in various sections.

The severity of the impact is also assessed as high because of the receptor sensitivity, given the already fragile sanitation system in many sections of the Project area. Therefore, the impact significance is major.

Impact Severity	Impact Likelihood

	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) All workers, including sub-contractors and casual labourers, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules.

ii) A licensed hazard material contractor will be engaged to handle sludge from pit latrines that have to be demolished to allow for Project implementation. In addition, content from pit latrines that have been demolished will be isolated to wait for handling by a licenced contractor.

iii) KCCA, as the Project Developer, will give ample time to Project affected residents to relocate or have other sanitary units constructed, as required. The KCCA Solid Waste Management Team, in the respective divisions, will be engaged throughout the process of demolishing and relocating sanitary units. The RAP process to cater for any resettlement will be conducted in line with Ugandan laws and World Bank standards to ensure that the severity of the impact is as low as reasonably practicable.

iv) Construction workers will be provided with appropriate PPE to protect them against any infections from working in high risk environments. The Contractor, should therefore show how he intends to deal with such areas during the bidding process or as one of the Plans in preparation for undertaking the construction works.

v) The Contractor will be required to secure the excavated sites by way of hoarding or installation of barricades to avoid access by the local population.

vi) Alternative safer access points will be established along with guiding warning signage to guide the communities from the safety hazards

vii) KCCA will construct communual toilets strategically located in areas where the Project implementation has resulted in increased pressure on community sanitation infrastracture.

viii) Almost all the project areas are served with community toilets run by the established User Committees. Since these toilets are run on a business model where users pay a small fee to maintain them, KCCA will allow affected people to use the toilets at the expense of the project for the duration of the construction period.

Adoption of the above mitigation measures will reduce impact severity to “low” level resulting in a residual impact of minor significance.

7.2.2.2.2 Construction Activity Hazards

Construction activities by their nature possess a degree of risk, such as lifting heavy materials, working at heights or in confined spaces. Carrying out construction activities in drainage channels along busy roads further increases the workers’ exposure to the risk of accidents from on-coming vehicular and cyclic traffic. For stone masonry lining in channels, workers usually have to size the stones to be used manually from large boulders using hammers. Such activity can have an adverse effect on a worker’s health that may be short term or long term if a chronic illness such as back or respiratory condition develops.

Construction activities hazards not only apply to the construction workers, but also the community members in the construction areas. The numerous residential areas traversed by the secondary channels are composed of a dense population and dense settlement profile which impinges on the

construction work space. The open excavated section for widening of the channel corridor pose a threat; such as falling in to the ditches especially by the children, adults, mentally ill, drunks in communities surrounding the excavated site. Exposure of the community to such accidents may lead to fracture, trauma, and even death where as socially may lead to restriction of free movement. Given that some of the Project areas are not well-lit, the risk of accidents could be higher during the night. These are only a few of the eminent risks associated with the construction work for this Project.

These impacts are reversible can be managed through application of appropriate safety measures and upon completion of the construction phase some impacts can be reversible but others may last a lifetime such as in the case of a chronic illness developed by construction workers, or permanent bodiy injury by a community member. Implementation of good construction practices such as use of PPE by construction workers, limited transportation to day time and cordoning off areas with risk to the communities will serve to keep this impact to as low as reasonably practicable to achieve a low incident rate throughout the Project construction period.

Impact Significance

The likelihood of occurrence of this impact is medium considering the safety measures that will be put in place during construction.

However, if an accident occurred at site, such as one from oncoming traffic, falling in to the ditches or a chronic illness or permanent injury from lifting heavy materials such as stones; then the severity would be high. The impact significance is therefore major.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) A specification in the contract will require the Contractor to prepare for approval by the engineer a Health and Safety Plan that sets out the measures to be taken to ensure the safety of the workers and the local community during the works. The contents of the plan should address as a minimum the following items:
   - Orient all construction workers on safe work practices and ensure that they are adhered to.
   - Safety training will be conducted routinely on how to prevent and manage incidences on site, and measures to protect the general public from construction site hazards.
   - Use of PPE for different work environments.
   - Procedure for reporting and/or responding to incidents.
   - Emergency evacuation procedure.

ii) All tasks will be performed by qualified and authorised personnel.

iii) Retro-reflective OHS signage, reflective warning tape, barricades, and reflective cones will be used to warn off and protect residents, curious passers-by and project employees of dangerous areas such as deep trenches or slippery areas along the channels.

iv) Night time lighting will be provided, as necessary in the different Project areas to ensure that staff and the general public are aware of, and protected from construction hazards.

v) The Contractor will inform the affected communities of the timing and duration of the construction activities across access roads and any uncertainties or potential for change. This

will serve to keep the neighbouring communities aware of the on-going works, the progress and any issues of community safety to note, such as diversion routes.

vi) Supervision of works will be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work.

vii) Strict instructions will be given for drivers of heavy equipment and delivery vehicles.

viii) Communication line must be ensured between workers and drivers of heavy equipment.

ix) Speed limits on access roads for project activities will be 30 km/hr for light vehicles and 20 km/hr for heavy vehicles.

x) Flagmen and traffic signage will be provided to warn motorists of heavy trucks or machinery turning off and joining the access roads for the project sites.

xi) The contractor must organise medical services for the employees in collaboration with area health officials.

xii) A site hoarding off permit will be acquired by the contractor allowing the contractor to hoard / fence off the open excavated areas. The hurdle will depend on the consulting engineers instruction as per contractors hoard off methodology, such as; use of iron sheets or concrete barrier blocks in very deep and wide excavated open trenches, use of a hoarding net in temporally excavated deep and wide sites (less than month) and safety tape for shallow and narrow excavations (minor excavations). This will serve to protect the general public from construction site hazards.

xiii) Alternative community access routes to be provided for the general public in areas where exisiting routes are dirupted by construction activities and these will be clearly indicated in the traffic management plan. Particular emphasis to be made in areas near schools, clinics and other such oublic infrastrusture commonly accessed by the general public.

xiv) The Project Contractors and sub-contractors will be required to provide appropriate PPE for their workers to ensure that any risks are minimized to a level that is as low as reasonably practicable (ALARP). Appropriate PPE will be used by the construction workers to minimize the severity of accidents on site, if they occurred. Approporiate construction site PPE includes:

Hearing (Over 80 Decibels for 8 hours a day requires hearing protection)

- Ear Muffs: One size fits all, comfortable, less ear infection risk
- Ear Plugs: Small, lightweight, can get dirty and cause infection

Head/Face/Eye (Working with mechanical equipment or crushing rocks)

- Safety Glasses: Protection from solids (cutting, sanding, grinding)
- Safety Goggles: Protects eyes from stray/ flying rock particles from rock crushing
- Adequate hard hats with clearly marked expired dates.

Hand (Use correct gloves for the job)

- Gloves: Protection against cutting, abrasions/ blisters, contaminated materials such as soils

Body

- Overalls: Can protect against dust, vapours, splashes

Foot Protection

- Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists
- Water Resistant Boots: Protection when working in wet conditions, especially through wetlands

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.2.2.2.3 Risks Associated with influx of migrant workers and Social Interactions

The construction workforce for the drainage channels will likely interact with the communities along the drainage channels during construction. Baseline studies revealed that a majority of the channels are lined by houses, oftentimes along the channel's very edge. Interaction between the residents and construction workers will be inevitable. In some cases, the construction workers may choose abode within the communities in which they are working so as to avoid long commutes from their homes. This social interaction between the workers and the community could result in sexual fraternization. This increases the inherent risk of spreading sexually transmitted diseases such as HIV and AIDS, as well as social tensions among the workers and residents in the community.

Besides, like any other project with mass recruitments, the behaviour of workers on and off the site, such as the use of abusive and vulgar language, malicious or accidental destruction to property, lack of respect to the locals and as already noted, engagement in sexual relations with underage girls and married women are bound to happen. This can be a potential source of conflict and breakdown of marriages in the project area.

Other associated risks such as Gender Based Violence, Violence against Children and Child Labour could result in the Project area as a result on on-going works and influx of workers in the areas. The baseline in Section 5.2.2 showed that a many of the channels traverse densely populated areas, of low income earners who typically live in slums and are therefore vulnerable to attraction to the workers who will most likely have disposable income. The lure of women and children in such circumstances will be a real threat.

Impact Significance

The likelihood of impact is high because construction workers will have to interact with communities in the Project area, especially residents living along the channel lengths.

Impact severity will be ***Medium*** because despite the fact that by its, nature the Project is is linear and so construction workers may not stay in one area for a long time the influx of workers can have multiple effects. For instance, the rise of conflicts as a result of influx of immigrant labour, though localized, temporary, reversible and noncumulative, can be in immense in magnitude, thus a negative change.

Besides, workers are able to change jobs meaning that it is likely, that workers on the concluding projects around Kampala will be available for implementation of this project. In addition, Works will be limited to day-time and since this is an urban project area, workers are likely to commute from their areas of residence to the project sites, thereby limiting the potential for sexual fraternisation between workers and the local communities. In addition, the impact is short-term and localised in spatial extent. Therefore impact significance is ***moderate***

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation Measures

- As a general recommendation, all Contractors shall be required to develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the Contractor's Human Resource Mannual.

- Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women;
- In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, establishment of a grievance log book at each project site and suggestion boxes should be established.
- Similarly, in liaison with local leaders, contractors should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities.

HIV/AIDS

As already noted above, influx of immigrant labour at the construction phase is bound to occur. Most often these workers will not come with their families and some may be single. This will encourage the formation of new social networks and sexual fraternisation with the resident community, increasing the risk of prostitution and the spread of HIV/AIDS and STDs. In general, the impact of increase in HIV/AIDS and STDs, though cumulative, will be largely localized/regional in context, moderate in magnitude, temporary and thus a moderate negative change.

i) As a contractual obligation, contractors will be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during Project execution. This will include a reporting procedure in the event that the community members have any issues to report as a result of the Project workers' behaviour and/or negligence.
ii) All construction workers will be orientated and sensitized about responsible sexual behaviour with Project area communities and inherent health risks associated with HIV/AIDS and other sexually transmitted diseases.
iii) As part of their Corporate Social Responsibility, the Contractor in coordination with KCCA will conduct HIV/AIDS awareness campaigns in the Project areas, particularly in slum areas, to avoid reckless lifestyle and spread of the disease in the area.
iv) HIV/AIDS policies should be developed at workplace and Cntractors should provide Free HIV/AIDS testing, counselling and condom distribution for both workers and local community;
v) Management of Social bonding at work place: The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. Social bonds are not readily controlled and the permanence of HIV/AIDS transmission makes this particular impact of social bonding both negative and also positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual exploitation can also occur. It is therefore important to tackle the issue of social bonding with firmness and fairness, forbidding power relationships, which lead to exploitation of mostly women and children, while encouraging relationships that may lead to permanent situations

Gender based violence, violence against children and child labour

vi) The Contractor will be required to prepare for the approval of KCCA a Code of Conduct to apply to all employees and subcontractors, and to agree with KCCA the mechanism for enforcing this code of conduct (this may include the removal of personnel from site and the reporting of personnel to the authorities as appropriate). The contractor wills be required to train and sensitise its employees and sub-contractors, to sensitise and advertise the code of conduct to which its staff will comply to the local community, to advertise the mechanisms by which the community can report activity that may be a breach of the code, and to monitor compliance with the code as well as report on compliance with the code. Appendix

I in Volume 2; Appendices provides guidance on issues to include in the Contractor's Code of Conduct.

vii) The project contract will be drafted on the backbone of the Constitution of Uganda and relevant laws and regulations such as the Employment Act (2006) and the National Gender Policy (1997) and Penal Code Act (as amended 2007).

viii) A clause protecting against gender based violence, violence against children and child labour will be included in the Project Contract, carrying sanctions upon breach of contract like withholding payments by the supervising consultant from the contractor.

ix) The contractor will be required to train and sensitise all the employees and sub-contractors about his approved and advertised code of conduct clearly spelling out penalties for noncompliance. Engaging his staff in building a mechanism that streamlines the code of conduct in their worker's association principles.

x) The Contractor will develop, for KCCA approval, a grievance mechanism by which the community can report any activity that may be a breach of the code, and to monitor compliance with the code as well as report on any non-compliance.

xi) The contractor will have an orientation on all the labour laws including the child labour law before starting works. The contractor will consult and involve the Division labour officers in each of the divisions to ensure that there is compliance on no child labour during construction of the channels. In addition, the contractor will confirm age of potential labourers prior to hiring through National Identity card, birth certificate or confirming with LC and community elders. KCCA Probation Officers will be available to provide guidance to Contractors and their employees' areas of compliance.

xii) Local area leaders in the Project areas will be asked to allow time particulary for the discussion of issues related to the Project during their regular village and committee meetings. Women should be allowed to voice their concerns and if necessary, hold focused group discussions to identify and deal with any issues of gender based violence, violence against children and child labour.

xiii) The Construction Supervision Consultant will have a Community Liaison Officer who will be responsible for logging and monitoting the redress of grievances. The Officer will be provided an office, to allow privacy and encourage whistle-blowing such that any vices of Gender-based violence, violence against children. The Grievance Mechanism and Grievance Mechanism Reporting Form is provided in Volume 2: Appendices, Appendix D.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance. It should also be noted that it is a legal requirement for the Contractor to prepare a separate ESIA for ancillary facilities such as workers' camps should they be considered necessary for project implementation.

7.2.2.3 Traffic Management and Safety

Construction activities will cause disruption to traffic flow as a result of construction material delivery trucks to various channel sections undergoing construction. Installation of road crossings such as culverts and bridges (Figure 7-6) will require traffic diversions or cause road constrictions, which could result in congestion on the roads. Some sections in the project area are accessible from very busy roads such as Bombo road, Mulago round about, Sir Apollo Kaggwa road, and the Kampala Northern Bypass. Work along these roads and use of these for access to construction sites will clog already busy roads, if traffic management is not properly planned beforehand.

Pedestrian traffic will also be disrupted in the communities along the channels since the existing channel crossings such as that shown in Figure 7-6 will be removed during the construction phase.

The impact on traffic will be short term, lasting only for the duration of the phased two year construction period.

Figure 7-6: A failed culvert crossing to be improved along busy road - Secondary 10, Lubigi (L) and a channel crossing (R)

Impact Significance

The likelihood of traffic disruption occurring is high, especially along road sections whose current culvert sizing is inadequate, requiring new culverts or bridges to be installed. Traffic disruption may increase the likelihood of road rage and safety hazards both to workers and road users. The impact is similarly high for pedestrians who have to cross the channels as they go about their daily routines.

The impact severity is also assessed as high because the traffic flow in Kampala is generally slow during rush hours. Any disruptions in the traffic will only serve to worsen the already congested roads. The receptor sensitivity will vary based on the volume of traffic conveyed on the various roads within the Project area. The significance of the impact is therefore major.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) The phasing of construction works will be such that the majority of works are undertaken during the dry season to reduce traffic impact on existing roads. This is because the exisitng trend is such that traffic congestion is worse during the rainy season.

ii) The Contractor will prepare a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings. Pedestrians' movement will also be carefully considered and catered for in the plan. KCCA will approve and assist in the implementation of the Plan. The Traffic Police will have to be given ample notice of the road junctions or culvert crossings that need to be worked on, so that a plan for re-routing traffic, or dealing with increased traffic in other areas is formulated in good time. The Plan will detail, among other things:

- Traffic control procedures along busy roads and intersections
- Community awareness
- Traffic management personnel
- Communication and warning system
- Emergency procedures
- Travel speed limits and control measures

iii) Delivery and storage of materials at the various construction sites should also be organized in a manner to avoid traffic disruption e.g. prior planning of material delivery so as to avoid delivery during the known rush-hours. Such delivery can be done during off-peak or weekend hours to minimize traffic congestion and accidents. Material stockpiles near roads tend to narrow the carriageway and cause congestion thus must be avoided. However, material stock piles shall be located as close to the construction sites as possible to minimize haulage distances.

iv) Drivers will be inducted at the start of the Project, and regularly reminded, about road safety and due diligence to ensure safety of other road users.

v) Flagmen will be provided to warn motorists of heavy trucks or machinery turning off and joining the access roads to the project sites.

vi) Appropriate safety signs shall be used during construction (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) during the construction period.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.2.2.4 Interference with Other Service Infrastructure

Service infrastructure such as water mains/pipes was installed across the drainage channels in some parts (Figure 7-7) and will have to be relocated during Project implementation.

Figure 7-7: (a) Water service mains running through Secondary 6 Lubigi at Nakulabye; (b) Water pipes running through and across Secondary 6, Lubigi; (c) An electric pole at the edge of the channel

Similarly, some electricity poles and communication service lines are located close to or along the channels. These will be affected during the construction phase of the Project implementation, and cause disruption to service delivery to the affected areas. If inappropriately managed, the can be a serious asafety hazard to the public and project workers through accidental falls and attendant risks.

This impact will be short term, lasting only while works are being done to relocate the service infrastructure.

Impact Significance

The likelihood of occurrence is high because service infrastructure will have to be either moved or relocated in the sections where it interferes with Project implementation.

The impact severity is ranked as high because the slummy conditions in most project areas are densely populated with narrow, unplanned and poorly maintained access roads and any disruption in such areas can have a serious effect. The severity would depend on the duration of the disruption while the receptor sensitivity would depend service consumer affected (the public, school, clinic, home, bar or restaurant, etc.).

Impact significance is therefore major especially if preventive, remedial/corrective measures hereunder presented are not adequately implemented.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) Project implementation will be done in close consultation with the respective utility service companies such as NWSC, UMEME and telecommunication companies. Consultations have been undertaken to inform companies whose infrastructure will be affected by the project implementation.

ii) All identifiable utility service lines in the right of way will be relocated in the pre-construction phase prior to the commencement of works to avoid interruptions from damage during the construction phase. Interference from service shut-down during the process shall be communicated to the potentially affected communities in advance.

iii) During construction, the Contractor will have to prepare a work schedule, which will be closely monitored and supervised by KCCA. KCCA will be obligated to inform any service provider whose infrastructure needs to be relocated. The lines of communication between the KCCA Project Manager and the utility owners should be very clear, not only to avoid delays in Project implementation but also to minimize the disruption caused by interference in service provision.

iv) The communities to be affected by any interference in service provision (water, electricity, or telecommunication signals); will be given ample warning and alternatives provided by the service provider, wherever possible. This will serve to minimize the impact of disrupting service provision, and hence improve acceptance of the Project in the communities through which the Project will be implemented.

v) Where the local infrastructure including community access roads is likely to be interfered with, the Contractors will ensure regular community engagements to alert them of the likely temporary blockades and the duration to avoid local outrage and opposition to the project.

vi) The Traffic Management Plan shall be prepared with well laid out procedures on shared use of community access roads specifying measures to avoid interruptions during peak hours.

vii) Community members shall, through regular community engagements, be informed of emergence contacts from the Contractor, Consultant and KCCA (the client) for emergence response in case of any incidents such as bursting water pipes and exposure to high voltage power service lines, etc., resulting from the project activities;

viii) Different avenues for receiving grievances from the local communities shall be established including the grievance book at the project sites and suggestion boxes in open areas. These should be made known to the local communities.

ix) Mechanisms shall be put in place to handle community grievances in a timely fashion. The Grievance Handling Committee at the Contractor's level and Authority (KCCA) level should be utilised to address these issues.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.2.2.5 Damage to Existing Infrastructure

The non-hard surface roads in the areas where the drainage channels are located will be used for accessing the channels during the construction and O&M. Some community access routes will also be affected. The damage to existing public roads could be due to considerable volume of construction traffic using the existing roads and passage of heavy construction equipment such as excavators, graders and murram trucks, which may exacerbate erosion of the road surface and hamper the motability of the local road networks. The surface of unpaved roads rapidly deteriorates with increased traffic during the rainy season. The construction workforce for the project will contribute to increased pressure on other social infrastructure especially health facilities.

Impact Significance

The likelihood of occurrence is medium since the construction works on the drainage channels will be planned to be undertaken during the dry seasons mostly. Less traffic is expected during O&M.

The severity of the impact would be medium in case the community roads deteriorate due to project activities. Therefore the impact significance is minor – moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) Rectification installation of the service infrastructure that intersects with the drainage channels will be planned to take the shortest time possible to minimise disruption of service for the users' communities.

ii) Trucks ferrying materials will be loaded commensurate with the recommended axle load for a given road to avoid or minimize damage.

iii) Use locally sourced materials, whenever possible, to minimize travel distances and expanse of road damaged.

iv) Some of the roads will be upgraded to allow easy movement of vehicles and transportation of materials.

v) The phasing of construction works will be such that the majority of works are undertaken during the dry season to reduce traffic impact on existing roads.

vi) Alternatives to disrupted community access routes to be provided, to ensure safety of the general public, particilarly children and old people.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.2.2.6 Impact on Physical Cultural Resources (PCR)

The project area is mostly developed with buildings including residential, industrial, schools, clinics, churches, and hospitals. With regard to PCR, the Bahai Temple in Kyanja (Primary 2), and some

graves in Kansanga (20 m off Primary 4 extreme upstream), were identified during field inspections through the catchment areas. However, the RAP process did not identify any PCR affected by this Project. PCRs identified in the general Project area will not be affected by the specific extents of the Project.

Impact Significance

The likelihood of occurrence of the impact on PCR is low because majority of the areas traversed by the channels within the drainage area are built up and wetlands. These areas are mostly disturbed with little chance of stumbling upon 'chance finds'. None of the PCR found in Kampala and described in Section 5.1.12 will be affected by the Project implementation. The RAP process did not identify any graves or such PCR affected by the Project.

The severity of this impact, if it occurred, is assessed as high because the loss of such resources is irreversible (OP/BP 4.11). Therefore the impact significance is moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) A Chance Finds Procedure has been developed as part of the Environmental and Social Management and Monitoring Plan, to guide the handling of any chance finds during project implementation. The Chance Finds Procedure, and a Chance finds report form are presented in Volume 2; Appendices Report and includes, among others,:

- Cease work immediately to avoid any further damage if chance finds are stumbled upon;
- The identifier must immediately inform his/her Site Supervisor of the discovery.
- Access to the site must be controlled and the site secured;
- The Site Supervisor must notify the responsible authorities, including the Ministry of Tourism, Wildlife and Antiquities; and
- Construction work could resume only after permission is given from the responsible local authorities and the Directorate of Museums and Monuments concerning safeguard of the heritage.

ii) Further still, the contractor shall develop and implement avoidance procedures. In the event of human remains, there shall be no further excavations or disturbance of the site until the responsible police authorities have been informed.

iii) In areas not covered by this ESIA, such as quarry sites and borrow pits, Project Briefs or ESIA will be conducted in line with NEMA requirements. The presence of any PCRs in such sites will investigated during these studies.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.3 Impact on biophysical environment

7.3.1 Negative Impacts

7.3.1.1 Soil Erosion and Degradation

Construction of drainage channels will impact soils prone to erosion, due to textural or slope characteristics. Higher slopes (up to 25% - 30%) were observed as characteristic of upstream sections of secondary channels especially in the Kansanga – Gaba catchment area (Section 5.2.1.3.2). In addition, areas with higher content of sand are especially prone to erosion when the channels are excavated. Therefore, these sections require adequate protection measures incorporated in both the channel design and construction plan to reduce the severity of erosion.

In sections where the Project Design Engineers have found that the existing channels are not adequate and should be widened, trench excavation will be done. A typical example of one such section is Channel 7 in Lubigi that is currently 2 - 3 m wide at the base but will have to be widened to 5 - 9 m at the base and 6 - 13 m at the top, increasing towards the confluence with Lubigi Primary (Figure 7-8). Such works will require excavation and heaping of the excavated soil within the construction area, awaiting collection and disposal. This increases the potential for soil erosion by wind or surface run-off, and the eroded soil would result in increased siltation in downstream water bodies. Erosion would be more pronounced during the rainfall seasons occurring the months of March – May and September – December.

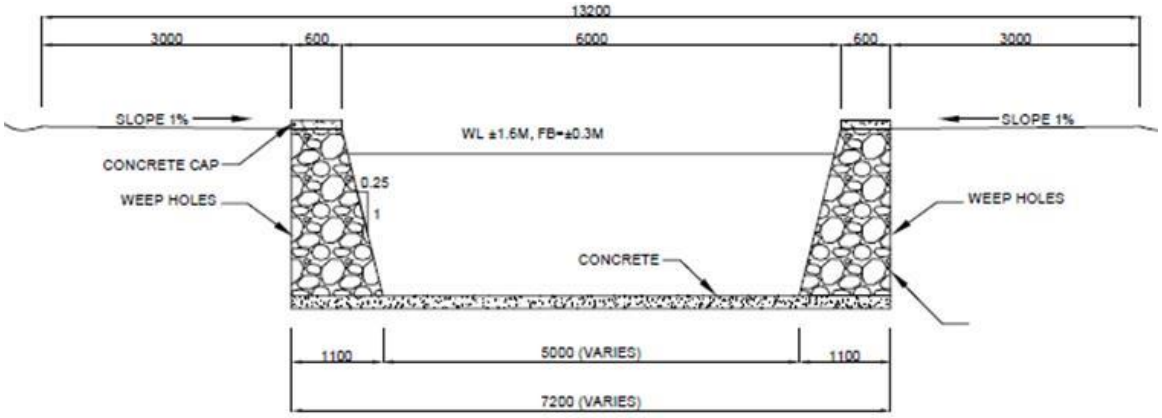


Figure 7-8: Example of channel section with stone masonry

This increases the chances for deposition of sediment into downstream wetlands located at confluences of primary channels and secondary channels (Lubigi – Secondary 5, 10; Kinawataka Primary Channel, Gaba Primary Channel and Kansanga Primary Channel). The deposition contributes to channelization flow through the wetlands and reduced effectiveness of the wetlands as buffer filters for the storm water runoff. Erosion can have other effects on soil, water and air as summarized in Table 7-1.

Table 7-1: Effect of soil erosion

Resource	Effect
Soil	• Sediment deposition causing land damage (e.g., need to rework ground because of sediment thickness or distribution, or crop loss), on-site or off-site. • Sediment deposition on roads, railroads, or bridges, causing safety problems for transportation, on-site or off-site.
Water	Water Quantity • Restricted capacity from sediment deposition in small conveyances (drainage ditches, road ditches, culverts, and canals), on-site and off-site. • Restricted capacity from sediment deposition in streams and lakes, on-site and off-site.
	Surface Water Quality

Resource	Effect
	• Suspended sediment and turbidity. • Suspended sediment or bed material having adsorbed pesticides and nutrients. • Degradation of aquatic habitat for preferred species.
Air	• Airborne sediment and dust causing safety hazards (vehicle travel on roads), on-site and off-site. • Airborne sediment causing vehicle, machinery, and structure problems, on-site and off-site. • Airborne sediment and dust causing health problems, on-site and off-site. • Airborne sediment causing conveyance problems in ditches, canals, and streams, on-site and off-site.

Source: Castro, J., and Reckendorf, F., 1995.

Soil degradation results from oil contamination by leakages from construction machinery and compaction of heavy machinery during construction activities. In particular, overfilling of the fuel tanks during refuelling of machinery would result in fuel spillages that contaminate soils. Hard soil surfaces contribute to enhanced runoff speed and quantity contributing to downstream erosion.

Impact Significance

The likelihood of occurrence of the impact of soil erosion and degradation is high because of the nature of drainage channel construction which will involve excavation of trenches, and the excavated soil heaped while awaiting collection for disposal. This increases the potential for soil erosion by wind and/or running water.

This impact will be short term, lasting only during the excavation phase of the construction period; reversible upon implementation of mitigation measures; and low in magnitude given the phased nature of the Project construction phase. However, considering that soil erosion impacts such as the nuisance that can be caused by dust, wetlands and receiving water bodies effects, as well as blocking of drainage channels that could result in localized flooding during construction and be felt outside of the project area, the severity of the impact is rated medium. Therefore impact significance is assessed as moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared and submitted by the contractor to KCCA for approval. A range of appropriate erosion and sediment control measures should be contractually required to be implemented during the construction of the drainage infrastructure, to minimise the potential for environmental harm on wetlands and local receiving water bodies. Listed below are measures that must be included in the CEMP to minimize soil erosion and degradation;

i) Clearance of vegetation will be limited to areas that will be required for construction of drainage channels. This will serve to minimize land disturbance as much as possible.
ii) Excavation of trenches to construct drainage channels will be done in a phased manner such that soil is not exposed for a long time before the channels are lined.
iii) Excavated material will be collected routinely such that heaps of exposed soils are not left in the Project area for long.

iv) Excavated material will be disposed of in approved locations to control erosion and minimize leaching of hazardous materials.
v) Heaps of excavated soil will be covered with tarpaulin to minimize exposure to agents of erosion such as wind and running water.
vi) Planning and management of stockpiles to minimise potential for "wash-out" and generation of sediment-laden runoff during rainy seasons. This would include covering stockpiles with tarpaulin to minimize exposure to agents of erosion such as wind and running water, and construction of bunds to minimise erosion from spoil or handling areas and temporary stockpiles, where feasible. Extra caution will be taken at the start of the rainy season by depleting the stockpiles of material and therefore minimizing the potential for "wash-out".
vii) The Project will make use of existing access roads to the Project areas to minimize the need to expose soil. Where new access roads are required, they will be made to follow natural topography as much as possible, minimizing side hill cuts where applicable.
viii) Fuel handling and oil spill measures will be implemented to prevent, control and address spill or leaks. Fuel and oil handling will be assigned to trained personnel and procedures for fuel storage, operation of mobile fuel tankers and refuelling areas will be well defined. Impermeable sheets, spill mats, and drip trays will also be provided in the appropriate areas to curb fuel and oil leakage to the ground. All equipment and vehicle repairs will be carried out under shelter to minimize potential soil and oil pollution during rainy seasons.
ix) Regular maintenance of operating machinery to keep it in good working condition, and hence minimize oil and lubricant spills. These are a potential source of soil degradation and contamination during Project implementation.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.3.1.2 Air Pollution

Exhaust emissions and fugitive dust emissions as a result of construction activities will occur during the construction phase. Sections with major civil works such as culvert crossings and bridges over busy roads (for example Nabweru road crossing, Mulago roundabout (*kubiri)*, Sir Apollo Kaggwa road) will necessitate the use of equipment with diesel engines such as excavators, scrapers, dozers, loaders, rollers, concrete mixers, compactors, and spreaders which produce fugitive emissions. Exhaust emissions from all fuel powered construction equipment result in localised impact on the air quality. Offloading of construction materials such as aggregates (fine, course or hard-core), stock piled material, loose material on trucks during transportation and movement of Project vehicles on unpaved roads will be sources of dust in the project area. Residential and commercial areas along the channels will be the most affected by fugitive dust emissions.

Excavation works could also result in the release of odour from the cut-to-spoil materials constituted of wetland soils (clay), silt and waste materials. The foul odour from wetland soils is attributed to the gases produced from anaerobic microbial decomposition of various organic material, oxygen depleted environment of the wetland systems. One of these gases is Hydrogen sulphide that smells like a rotten egg. More purgent smell may arise from the release of sewage waste from the slummy environment into the drainage channel systems and careless dumping of biodegradable waste material. This foul smell can be a nuisance to the communities in the immediate environs.

This will be a short term impact, localised in spatial extent since its occurrence will be limited to the construction phase in a particular section. The receptor sensitivity will vary by location, depending on the density of the population within the different Project areas and also on the weather conditions (more intense during the dry season). The impact is reversible upon implementation of the mitigation measures and adherence to good construction methods.

Impact Significance

The likelihood of occurrence of this impact is high as a result of construction activity, especially in the busy and densely populated commercial and residential neighbourhoods within the Project areas. Most of these areas have unpaved roads which will be used as access roads.

Baseline air quality measurements in Section 5.2.1.4 showed that the environment within the Project area is generally pristine. However, the severity of the impact is assessed as medium considering the localised and brief nature of the impact for the most part, especially during material delivery at the various construction locations. The nature of the construction works required for drainage channels is such that works will be phased and carried out in sections, which helps to reduce the severity of construction impacts. The severity is intensified by impact occurrence during the dry season and availability of windy conditions. Therefore the impact significance is moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) Sensitisation of local residents will be undertaken prior to the start of the construction works. It will be particularly important to:
   - Inform local residents of the timing and duration of the construction activities for specific channel sections and any uncertainties or potential for change;
   - Provide them with an understanding of the potential sources of exhaust emissions, fugitive dust and odour from excavation works.
   - Agree to excavate during periods when the immediate residents are out for work and further harmonise working hours with locals in busy business environments (during sensitisation campaigns) to avoid economic effects from loss of clients due to foul adour

ii) Delivery vehicles will be switched off when not in use so as to minimize the release of fugitive emissions;

iii) Contractor's vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimise potential emissions.

iv) Trucks delivering materials will be covered with tarpaulin to reduce the risk of fugitive dust emissions, especially in busy residential and commercial areas;

v) Waste from site to be transported by licensed companies for waste transportation. The trucks should be appropriately covered to minimize the problem of odour during transportation. Similarly, any excavated silt that has been identified as having an odour, or categorized as hazardous to be appropriately handled by companies licenced to transport and dispose of hazardous waste.

vi) Delivery vehicles will be restricted to stabilised areas on site as far as practicable, to reduce dust generation and sediment tracking onto local roads;

vii) Strategically locate temporary material stock pile areas in the proximity of the construction sites to reduce the haulage distance, and therefore levels of dust and exhaust emissions.

viii) Suitable controls will be implemented for exposed stockpiles and unsealed construction areas (for example covering or spraying with water as appropriate) to minimise dust;

ix) Vegetation clearing will be limited to the minimum required for safe construction to minimise exposed areas and vegetation removal;

x) Exposed areas to be stabilised as soon as reasonably practicable, and seeding and planting for landscaping to be done;

xi) Regular removal or wash away of construction dirt from sections of adjoining roads;
xii) Watering of access roads e.g. with use of a water bowser, will be undertaken in areas where people reside along heavily used sections which are prone to dust generation.
xiii) There will be no open burning of waste resulting from project construction activities.
xiv) KCCA's grievance management procedure (Appendix C) will be implemented to enable local communities along the channels to report nuisance issues and for these to be addressed in a timely manner.
xv) Project implementation shall ensure that excavation activities and lining of the channels are carried out expeditiously to reduce on the time of exposure to the foul odour.
xvi) Stockpiling of the excavated materials to drain before haulage should not be located around or close to the residential areas to reduce exposure to the smell.

Adoption of the above mitigation measures will reduce impact severity to "*low*" level resulting in a residual impact of "*minor*" significance.

7.3.1.3 Disturbance due to noise pollution and vibrations

Construction vehicles and machinery including bulldozers, graders, compactors, front-end loaders, pumps and dump trucks during channels' trench preparation will generate noise and some ground vibrations. Stationary equipment that may generate noise from one general area may be limited to the water pump that may be used when there is need to empty the ponding excavated channel. The mobile equipment which may include the dozers, graders, scrapers, etc, may be operating in a cyclic fashion whereby a period of reduced power is followed by a period of reduced power.

Noise from construction equipment, workers and construction traffic will cause disturbance, especially in densely populated residential areas. In the densely populated residential areas such as Katanga, Mulago, Wandegeya, Bwaise and Kosovo, the noise disruption would especially be an adverse impact. Some sections of channels to be improved are located near schools and health centres (**Error! Reference source not found.**). Construction activities occurring during school term can contribute to interruption of the school activities and disturbance of patients in clinics and health centres. Vibrations mainly from the compaction process will be short lived but are known to result in cracking of structures near the construction site. The noise and vibrations will be from activities that will be confined to daytime hours when potential for disturbance is less. They will last only for the duration of the construction phase in a particular section.

Figure 7-9: Example of a school and clinic along a secondary channel in Lubigi catchment

The receptor sensitivity for this impact will vary with location since some areas are densely populated while others are not-so densely populated, some areas are within industrial parks such as Ntinda Industrial area, and still others are near schools and health centres (clinics). The impact may thus be more intensive to the population resident closest to the channel as well as schools and

health centers where exposure to alternating sound levels from the construction equipment. Workers are also likely to be affected by noise emissions as they will be operating closest to the construction equipment.

It is expected that this impact will occur during both the construction and O&M phases, although considerably reduced intensity during the latter phase because of the routine nature of maintenance works.

Impact Significance

The likelihood of the impact occurring is high, considering that the channels within this Project scope are located mostly within residential and commercial areas. Project implementation will require the use of machinery for works such as trenching or excavation of a channel, and road works on culvert crossings over tarmacked/asphalt roads. In addition large trucks will be used for material delivery and removal of debris and dredged material.

The severity of the impact is assessed as medium, considering that the baseline measurements for noise in Section 5.2.1.5 showed that 80% of the locations sampled within the project area had ambient noise levels above the national limit. The results of the baseline studies indicate that construction activities during day time would not greatly impact on the surrounding environment especially because equipement will be intermittent although it is possible. In addition, the construction work will be localised to the sections with construction works ongoing and is largely reversible and easily manageable with the implementation of mitigation measures. Therefore the impact significance is moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) Sensitisation of local residents will be undertaken prior to the start of the construction works. It will be particularly important to:
   - Inform local residents of the timing and duration of the construction activities for specific channel sections and any uncertainties or potential for change;
   - Provide them with an understanding of what is involved, including the nature of earth moving activities (excavation and compaction works plus grading) and perception vibration and associated risk to safety.

ii) The Contractors on site shall be made aware of, and adhere to, the regulatory noise limits for a construction site in a commercial area (70 dBA) and that in a residential area (55 dBA) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003. The Contractors and workers should be especially mindful when carrying out construction near sensitive receptors such as schools, clinics and places of worship.

iii) Construction workers shall be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise. This PPE must be worn near any equipment that causes noise levels of 85 dBA or more.

iv) Construction activities will be limited to daytime, especially in residential areas to minimize disturbance of residents.

v) Construction works near public institutions such as schools should be harmonized with school programmes to consider works during holidays and weekends.

vi) The proposed project contractor will be contractually required to select and operate plant and equipment with appropriate mufflers and noise controls, and to adopt work practices which would minimize noise impacts to as low as reasonably practicable.
vii) Regular care and maintenance of vehicles and equipment must be undertaken to ensure they run smoothly so as to minimize emissions of noise.
viii) Project machines and vehicles will be turned off when not in use.
ix) Should noise complaints be received, noise monitoring will be undertaken by the contractor and if measured noise levels exceed legislative limits then measures will be taken to reduce the noise at source or through attenuation. In addition, KCCA will liaise and work with the affected receptors to determine a mutually acceptable way to proceed.
x) Works scheduling should ensure that no operations are undertaken over the weekends and most particularly on Sundays when a great majority of local community members are expected to be home

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.3.1.4 Improper management of Project- generated waste

The construction activities of masonry lined channels (lining of stone, Armorflex, or Cable Concrete) and road crossings such as culverts and bridges, will produce a considerable amount of construction waste. Waste from food and drinks packaging consumed by construction workers will also be produced. In addition, construction workers generate considerable amount of sewage on a daily basis. The Contractor's yard will also be a source of waste, such as used oil, wood cuttings, scrap, office waste, grey.black waste and medical waste from the on-site clinic.

Demolition of structures within the channel corridor will be a major part of the project implementation. Some sections of channel are very densely populated and as such, will result in large volumes of debris. Contaminated soil, as a result of sludge from demolished pit latrines along the channels, is also a potential waste material to be dealt with in this Project that has ability to cause disease outbreaks and public health challenges.

Improper management of construction waste could have adverse impacts on the environment, resulting in soil and water contamination, as well as damaging visual aesthetics due to littering or heaps of collected garbage near the channels. This impact is mainly short term, occurring during the construction phase, but spatially extending to the sections undergoing construction at a particular time, and the Contractor's yard location.

Impact Significance

The likelihood of this impact occurring is high because construction generally results in generation of waste. Additionally, some sections of channels currently have stone masonry lining which will have to be removed before widening can be done as required by the designs. The severity of the impact is high because if not well managed, the generated waste can have adverse impact on public health, air quality, soil, water and hence ecology. Therefore the impact significance is major.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle. This can be implemented by use of accurate

estimates of dimensions and quantities of materials required, use of durable materials that will not require replacement often, providing proper facilities for handling and storage of construction materials to minimize waste by damage.

ii) A waste management plan will be developed by the Construction Contractors, and approved by KCCA to ensure that measures for handling all Project-generated waste are in place. The Contractor and sub-contractors will be obligated to ensure responsible waste management, for example collection of waste by a NEMA Certifed waste handler to dispose of waste to a licensed area/ landfill. It should be considered that in some sections, the silted material could be hazardous, particularly areas within and downstream of industrial areas and slums. Silt in such locations should be tested, and if found to be hazardous, should be handled by a licensed waste contractor for hazardous waste. The KCCA Project team to undertake audits of the waste transportation contractors and final disposal facilities to ensure that Project-generated waste is being handled by facilities that have adequate capacity to physically and environmentally handle the potentially contaminated material.

iii) Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage.

iv) Construction waste shall not be left in stockpiles along roads, but removed and reused or disposed of on a regular basis.

v) Human waste will be properly managed through provision of onsite portable toilets, with consideration for the number of workers on site during construction. Separate toilets will be provided for female workers.

vi) Any hazardous wastes generated by construction activities (e.g. emptying pit latrine contents) will be collected and transported off site to the appropriate licensed waste storage facility (NWSC treatment plants) for treatment prior to final disposal by a licensed contractor for hazardous waste.

Adoption of the above mitigation measures will reduce impact severity to “low” level resulting in a residual impact of minor significance.

7.3.1.5 Impact on Ecological Environment

From the ecology baseline studies conducted on plant, invertebrate (butterfly and dragon fly), terrestrial vertebrates (amphibians and reptiles), and bird species (Appendix B), it was found there are generally no large populations of plant and animal species of conservation concern in the Project area, although the presence of some IUCN and/or Regionally listed species was recorded.

- Plant species;
  - Plant species such as *Pistia stratiotes and Nymphia lotus* known to survive on open water surface were rare which indicates that very few expanses of open water exist in the catchment probably due to receding water table or direct evaporation.
- Birds species:
  - In the Lubigi catchment, one (01) Endangered (E) species the Grey-crowned Crane (IUCN 2013), one (01) Near Threatened (NT) Papyrus gonolek (IUCN 2013), three (03) Regionally Near Threatened (R-NT) and one (01) Regionally Restricted Range (R-RR) were recorded.
  - In Kansanga-Gaba catchment, Two (02) species of regional importance Gray-capped Warbler regionally restricted range and Purple Heron regionally near threatened Birdlife (2011) were recorded.

Most of the impacts on ecology may be due to vegetation clearance, road kills and harassment of reptiles but existing level of habitat degradation reduces the impact likelihood. The baseline survey findings in sections 5.2.1.2.1 and 5.2.1.2.2, and Table 5-9 describe the extent of human degradation of Lubigi drainage system. Figure 7-10 is the graphic presentation of the extent of wetland degradation as discussed in the baseline chapter. Overall, any reduction in the spatial extent of the existing wetlands could contribute to reduced ecosystem services and habitat for the identified range

of bird species and wetland fauna. This could apply to isolated parts of Gabba and Kansanga primary drains. Channelisation in wetland area could further affect their critical hydrological functioning.

Figure 7-10: A degraded wetland section (inset and a 1.02km stretch in red) along Lubigi Drainage channel and the stretch (yellow 1.56km) outside the degraded wetland both planned for lining.

Human activities in any natural environment affect herpetile fauna in two ways: adversely, by destroying natural habitat, and favourably, by creating new habitats (Khan, 1990). The major impact especially for wetland specialist birds could be as a result of vegetation clearance during the construction phase. Vegetation clearance deprives the birds of breeding grounds, hence exposing eggs and chicks to predation.

This adverse ecological impact would however be mostly conceivable if the drainage Works were to extend into the relatively more intact wetland ecosystems down stream. Eventhough channelization has been considered for Lubigi Channel through a wetland, as shown in Figure 7-10, it has already been severely degraded that any ecological impact may be very limited. In addition, almost all secondary channels as is the case of Nakamilo (shown in Figure 7-11 below) flow through heavily settled areas that were once wetlands. These wetlands have been degraded to the extent that the Technical Working Group of the Policy Committee on the Environment has proposed through Uganda Cabinet that they should be declared vanquished[4] and that land titles in such areas should not be even considered for cancellation.

[4] *The Technical Working Group of the Policy Committee on Environment proposed through the Cabinet Minute 114 (CT 2014) cancellation of land titles in wetlands on public land acquired unlawfully after 1995 to address wetland degradation. However, TWG also proposed that some wetlands be declared "Vanquished"and that land titles therein should not be cancelled. The TWG proposed guiding principles for deciding on whether the wetland is vanquished and. Among others, the TWG suggests that for a wetland to be declared vanquished, it should be providing essential goods and services for public good including waterworks, wastewater treatment facilities, ports, marinas, roads/bridges and electricity power lines.*

Figure 7-11: Nakamilo channel profile as it discharges into Lubigi Primary channel in Bwaise area

Figure 7-12: The wetland stretch extending between chainage 1.78 and km 3.06 is not to be lined and the inset shows the state wetland degradation at the discharge point.

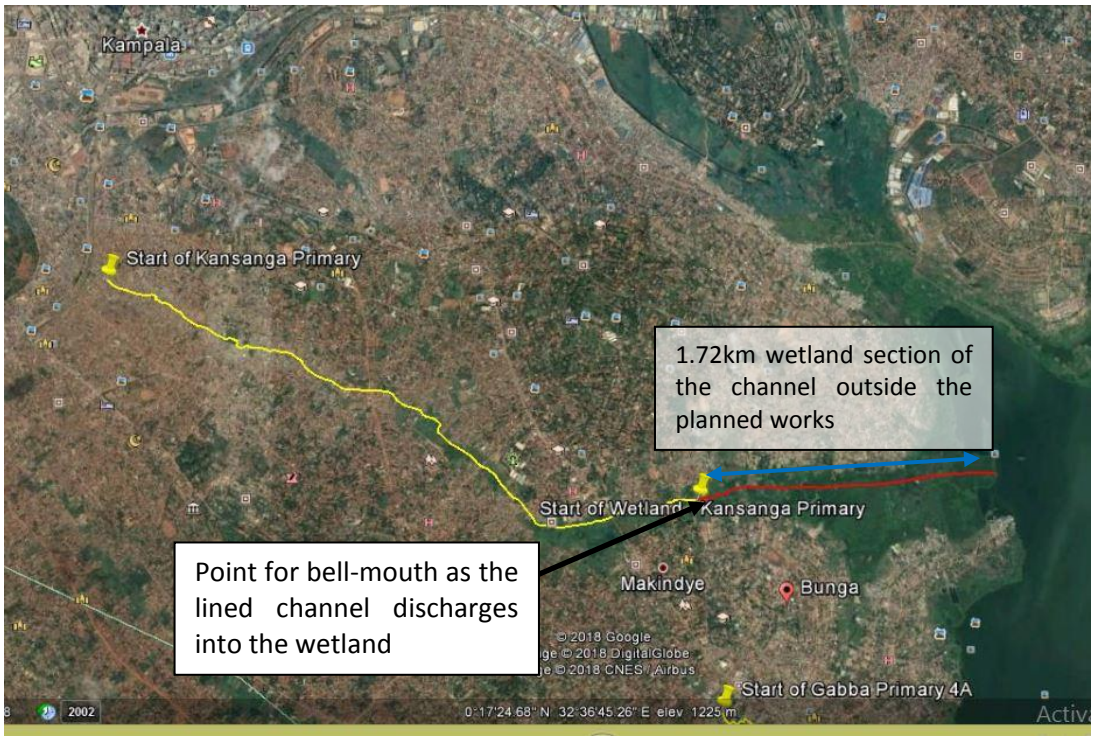


Figure 7-13: Extent of planned channelization (yellow) on Kansanga Primary channel and the wetland stretch (red) to be left uninterrupted by the planned project activities

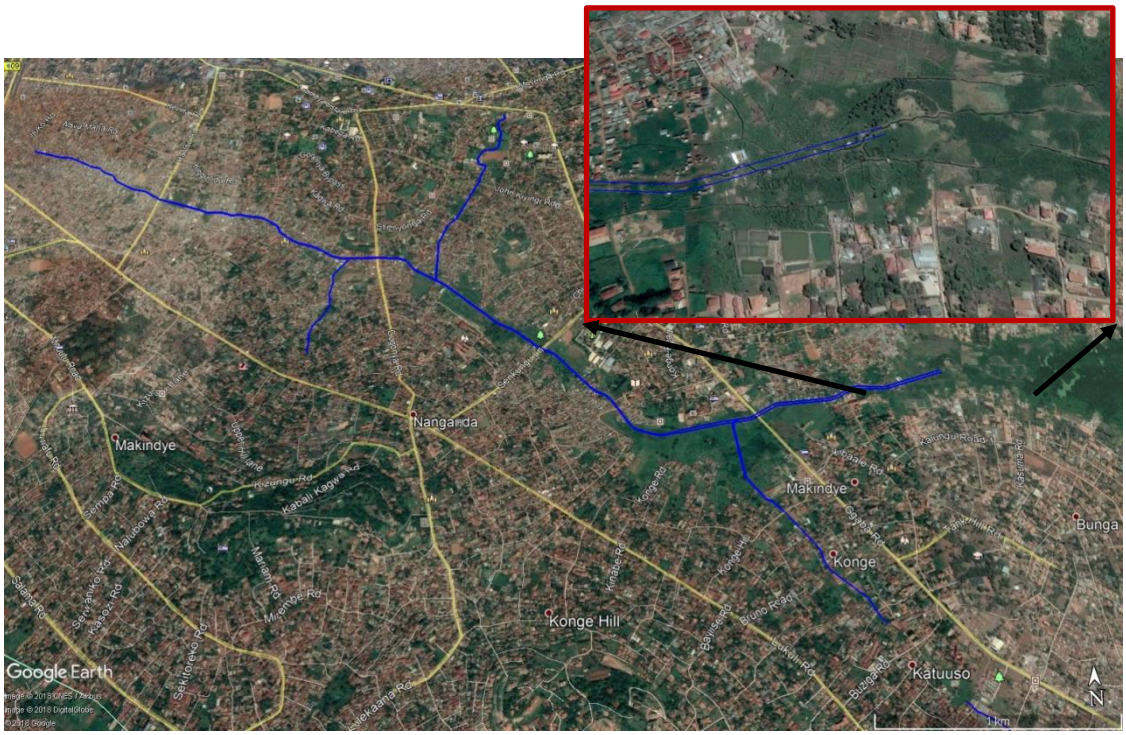


Figure 7-14: Extent of Kansanga Primary Channel, adjoining secondaries and the mosaic of gardens (inset) in what should be a wetland at its discharge point.

Figure 7-15: Extent (length) of Kinawataka wetland as it discharges into the wetland system

Generally, the downstream reaches of all the primary channels will be left natural. In Lubigi channel, Works are planned to stop at Hoima road. Even besides the fact that the wetland has already been degraded; modifications have been suggested to modify the design and reduce on the initially proposed extent of Works as discussed in mitigation No. v) below and Figure 7-16. Table 2-11, Table 2-12, and Table 2-13 in this report present the full lengths of the primary and secondary channels including the extent of proposed Works.

Impact Significance

The likelihood of the impact occurring is low. This is because, despite the majority of the downstream sections of secondary channels and most of the entire lengths of the primary channels being drained through wetlands, the Project designs did not provide for permanent channelization of the wetlands. Works proposed on Lubigi channel are limited to the areas that have already been altered by encroachment for construction and settlements. Therefore any potential land take to support project activities is likely to be more social than ecological impact. Besides, sections of the surviving vegetation have already been cleared for expansion of the Northern Bypass along which Lubigi Channel flows before discharging into Lubigi wetland downstream.

For the foregoing reasons, impact likelihood is low. The severity of this impact is assessed as medium considering the current state of degradation of the wetlands, and the great reduction in the spatial extent of wetlands within Kampala in direct comparison with their importance to the ecosystem. As already noted above, the proposed project is limited to the already degraded sections of the wetland where existence of bird species of conservation concern within the Project area (Appendix B) will not be affacted. Thus impact significance is assessed as minor.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) No permanent wetland ecosystem conversion to channel corridor will occur as per the Project designs. Where the channel interfaces the wetlands along the Gabba and Kansanga Channels, a bell-mouth structure will be constructed to enable the release of stormwater into the wetland system for the natural sequestration services by the wetland ecosystems. This will avoid direct release of contaminants into Lake Victoria.

ii) Overall, KCCA will carry out vigorous monitoring activities to ensure that no works occur in intact wetland ecosystems beyond the planned extents.

iii) The Supervision Engineer shall recruit a competent environmentalist and carry out regular monitoring of construction Works to ensure that the project does not extend into wetlands. The consultant will submit regular site checks and submit timely communication in the event of non-compliance.

iv) The Consultant and Client (KCCA) will review and approve the Contractor's Environmental and Social Management Plan during the preconstruction phase before it's transmitted to the Bank. No Works wll commence before a comprehensive ESMP is prepared and approved.

v) KCCA will conduct spot-checks on the Contractor to ensure that the project Works are limited to the drainage designs and the general non-conformances are identified.

vi) Comptent personnel including an environmentalist with proven experience in ecology will be retained as part of the Supervising Consultant team, to ensure constant monitoring, especially during the vegetation clearance stage. Equipment will not be allowed beyond the extent specified in the designs. This will allow for minimal damage to the flora and fauna in the Project area, as a result of Project implementation. Any chance finds in this regard will be repoted to the Ecologist who will provide guidance on the appropriate action.

vii) To minimise the impact on the degraded Lubigi wetland, the proposed width of Lubigi channel will be reduced from the designed 160m to 100m as illustrated in Figure 7-16. KCCA shall however aquire the remaining wetland section from private owners and protect it from further degradation. This is because where similar encroachment on waterways occurs, it almost certainly induces increased development wich further degrades the wetland further as was the case of the previous intervention on the upstream reaches of Lubigi that are currently complete with settlements up to the channel banks. Concrete pillars will be established to demarcate the acquired wetland section that will be strictly protected from further encroachment.

viii) The Contractor must avoid the impediment to water flow in the channels during and after construction work.

ix) During construction habitat disturbance should be minimized as much as possible. To minimize death, vegetation clearance should always be done first, as this scares away some amphibians and reptiles, as opposed to direct use of graders to clear land, or direct dumping of construction materials and excavated soils.

x) The construction workforce should be encouraged and sensitised not to harass herpetiles.

xi) The contractor must not dump construction waste in the wetlands.

xii) People currently extracting from these wetlands will be monitored and controlled to work with the regulatory framework so as to maintain the status and habitat quality of these wetlands.

xiii) Authorities responsible for the protection of wetland resources such as NEMA and WMD should clearly demarcate the boundaries of wetlands, and also enforce the protection of these wetlands such that destruction or conversion of this important resource is curtailed.

xiv) Restoration of any access roads will be done by the Contractor, particularly in the wetlands.

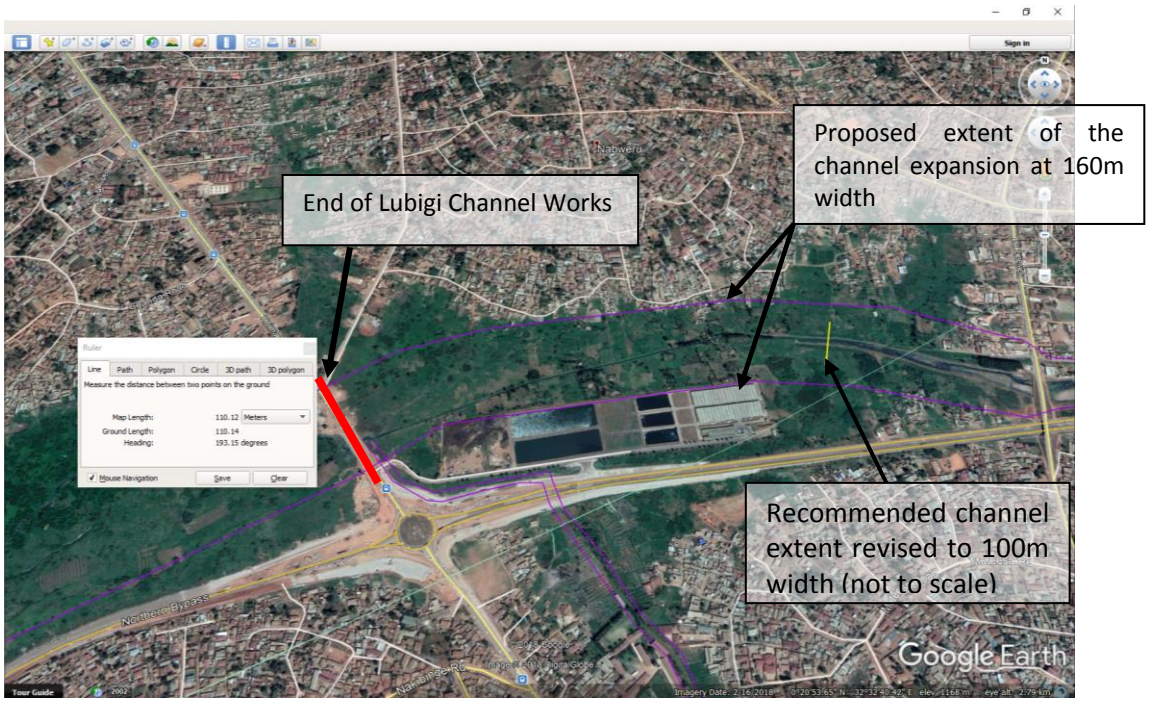


Figure 7-16: A section of the degraded wetland along Lubigi channel, the design extents and the recommended (not to scale) section (yellow strip or as illustrated)

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of negligible significance.

POST-CONSTRUCTION PHASE (OPERATION AND MAINTENANCE)

7.4 Impact on socio-economic environment

7.4.1 Positive Impacts

7.4.1.1 Improved Storm Water Drainage

Section 5.2.1.1 highlights the baseline condition of flooding in the project area. Low-lying areas within Kampala City have had flooding problems for a long time, with residents having to live in constant worry during the rainy season. Areas such as Bwaise and Kalerwe are commonly known to flood after every heavy downpour (less than the design Q_{10}), with media houses getting pictures such as those shown in Figure 7-17 to show how dire the situation is. Houses in some areas have been deserted on account of the flooding menace during the rainy seasons.

Figure 7-17: State of inundated residential and commercial areas in the media after heavy rains

Implementation of this Project will go a long way in solving Kampala's stormwater management problems such that flooding after rainstorms becomes a very rare occurrence, especially in the Catchment areas of Lubigi, Kansanga, Gaba and Kinawataka.

Implementation of this Project in the priority areas identified in Kampala's stormwater management system and engaged the Project Design Consultant to provide recommendations and designs aimed at rectifying the problem. The designs are of hydraulic structures that can adequately convey a ten-year flood (Q_{10}), thus greatly minimizing the risk of flooding after every storm in the affected areas. Typical sections of the channel types to be applied during this Project are provided in Figure 7-18.

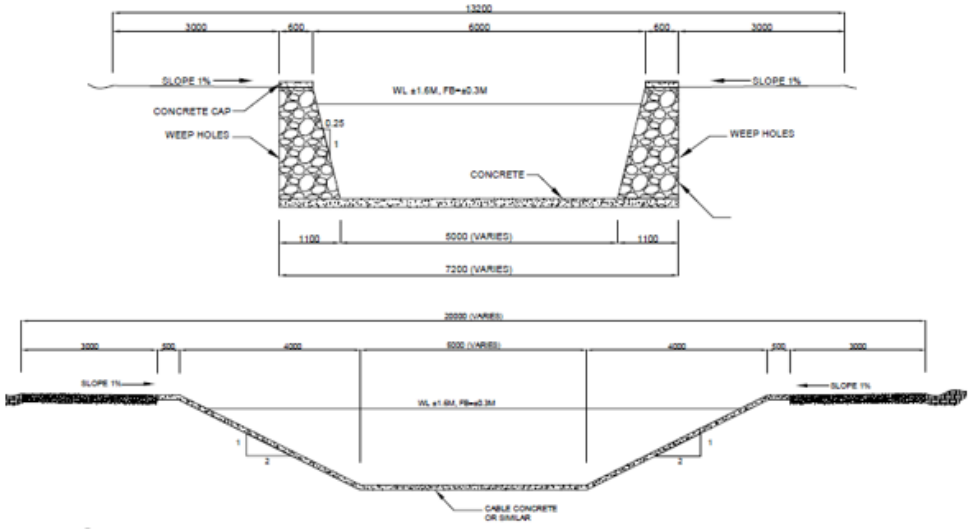


Figure 7-18: Typical channel sections with stone pitched lining (top) and concrete lining (bottom)

Enhancement measures:

i) Construction material and methods will be according to design standards such as those for Roads and Bridges so as to ensure that the drainage system infrastructure is efficient throughout the design life.

ii) The Project Design has incorporated box culverts into the channel designs, to replace pipe culverts in locations where pipe culverts were identified to be inefficient in storm water conveyance (Figure 7-19). Box culverts have a larger flow open cross-section that minimises waste blockages due to accumulation.

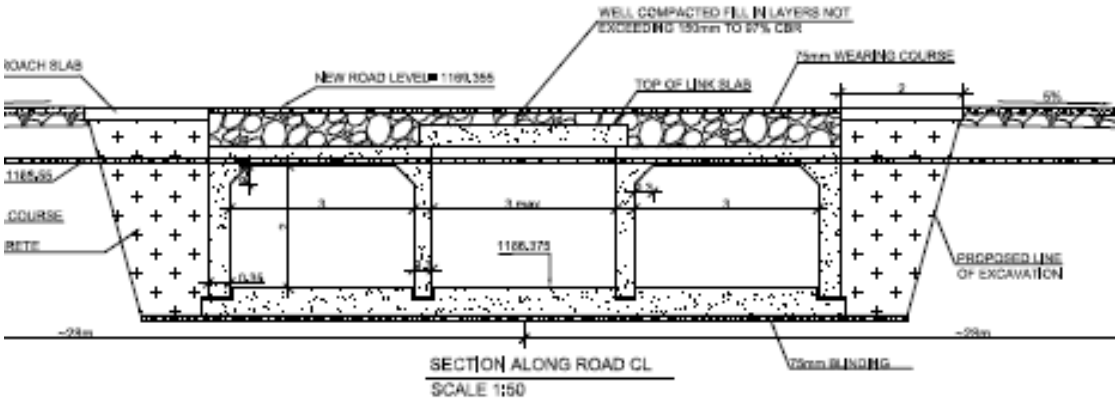


Figure 7-19: Typical section showing box culverts used in the Project Design

iii) KCCA will improve the solid waste management in the City to alleviate the existing problem of blockage of culverts and drainage channels by garbage. KCCA has recently privatised the

garbage collection service and allowed three (03) private licenced Contractors to handle garbage collection in the seven (07) zones in the different Divisions in the City. A Community Waste Management System shall be streamlined through local community leadership and KCCA Solid Waste Management Teams to control against the accumulation of solid waste materials along the project sites. KCCA shall ensure that all stakeholders are mobilised to the cause to ensure community awareness and direct their focus on effective waste collection to avoid clogging of the channels through blockage of culvert crossings. KCCA Solid Waste Management Officers in each Division shall identify the channels where to intensify solid waste management activities.

iv) The respective KCCA Waste Management Teams in the Divisions will run campaigns periodically to engage communities and sensitize on the available programmes for improving waste management. KCCA supports community inititatives for clean ups, which are led by Sanitation Committees in the villages.

v) Development of a Policy or Bylaw by KCCA to encourage the planting of vegetation (grass, shrubs, flowers) to reduce the bare surface area in the City, and in effect reduce siltation in the channels.

vi) Development of Guidelines by KCCA to encourage rain water harvesting in the City, especially for new construction Projects, so as to reduce on the volume of run-off to be conveyed through the channels.

vii) Regular maintenance works will be undertaken by KCCA to ensure that the channels are always in proper working condition, and thus avoid the current state of blocked or broken culverts.

viii) Swales will be integrated into the City's tertiary and quaternary drainage channels in an effort to improve the quality of water conveyed into and through the secondary and primary channels (A discussion with DWRM revealed that the Nakivubo channel has greatly contributed to the deterioration of the water quality in Murchison Bay on Lake Victoria, where it drains).

ix) A mega sensitisation campaign in the City will be undertaken to encourage respect of the drainage channel corridor for access for maintenance purposes, and wetlands for flood retention purposes.

x) Sanitation Committees will be selected at the village level, through the political leadership, to encourage community involvement and participation in keeping the City clean. KCCA piloted the use of '*bulungi bwansi*' drives in cleaning up some areas in the City. Following the success of such drives, KCCA will roll out similar campaigns throughout the City.

xi) KCCA, with the assistance of area local leaders will implement stringent fines on improper garbage disposal, inorder to discourage irresponsible waste disposal.

7.4.1.2 Improved Community Health and Safety

The current drainage system in the City is very poor as described in Section 2.3. Majority of the culverts are either undersized or blocked with silt and garbage to the extent that they are rendered inadequate to convey storm water characterized by broken and/or failed culverts, gulleys along the channels and garbage heaps along the channels as shown in Figure 7-20. Improvement of the drainage infrastructure, including channel widening and deepening, and culvert replacement to ensure water can be adequately conveyed at different sections will result in a more efficient conveyance of storm water. This will have the overall effect of a reduction in the occurrence of stagnant water within channels in the various Project areas. This hydraulic improvement also has a bearing on improved community health and safety as a result of reduced risk of exposure to water borne diseases such as cholera, and malaria whose occurrence is medically linked to stagnant water.

Another aspect of improved community health and safety will be the improvement of solid waste management within the City, as part of an integrated management system of the Priority Drainage Improvement Project.

Figure 7-20: Typical garbage disposal problem (L) and stagnant water (R)

Enhancement measures:

i) Regular maintenance works will be undertaken by KCCA to ensure that the channels are always in proper working condition, and thus avoid the current state of blocked or broken culverts.

ii) Regular sensitisation campaigns in the City will be undertaken to encourage respect of the drainage channel corridor for access for maintenance purposes.

iii) Integration of a solid waste management program with the drainage Project to reduce the risk of blocked culverts as a result of garbage disposal into the drainage channels, or open dumping which results in garbage being carried into the channels by storm water.

7.4.1.3 Access Roads for Maintenance

The upgraded channel top width will be much wider than the existing channels, with some channels having a designed top width between 17 – 20 m. Given that the existing conditions of the access road to, and along, the channels are not clearly defined and mostly narrow and impassable by vehicles; there will be need to improve them to allow carriage of increased traffic load. Access roads will also be constructed to allow for maintenance of the channels. This is will be beneficial to the community since they will also be using the same roads. This is a positive and long-term impact especially if the roads are regularly maintained by the KCCA.

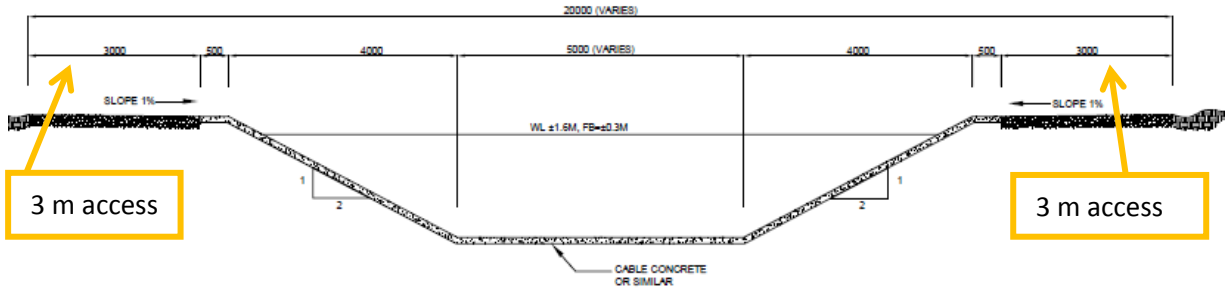


Figure 7-21: Section for one of the designed channels providing for 3 m access on each side of channel

The Ministry of Works Design Manual recommends 3 m access on either side of channel (Figure 7-21). The Project Design has provided for this. These access roads will be used for delivery of materials during construction and by maintenance trucks during the O&M phase. This is especially important since one of the contributing factors to the blockage of culverts within the drainage

system is the lack of vehicular access for maintenance trucks to pick up dredged up materials from the channels after cleaning (Section 2.3).

Enhancement measures:

i) Markers to indicate the extent of the channels will be provided for the channels to enhance community safety and minimize the risk of falling into the channels. Relief paving at the edges of the walkway closest to the drains as a physical and visual warning concerning the proximity to the channel edge will also be incorporated as part of the channel designs as shown in Figure 7-22.

ii) As a way to show the 'safest' side of the corridor in the event of a flash flood (if the walkway extents are not visible as a result of water in the channel flooding above the channel walls), the corridor markers on the periphery are proposed to have green reflective paint at a level above maximum possible flood height and bollards proposed along the channel edges to have red reflective paint also at a height above possible flood level (Figure 7-22).

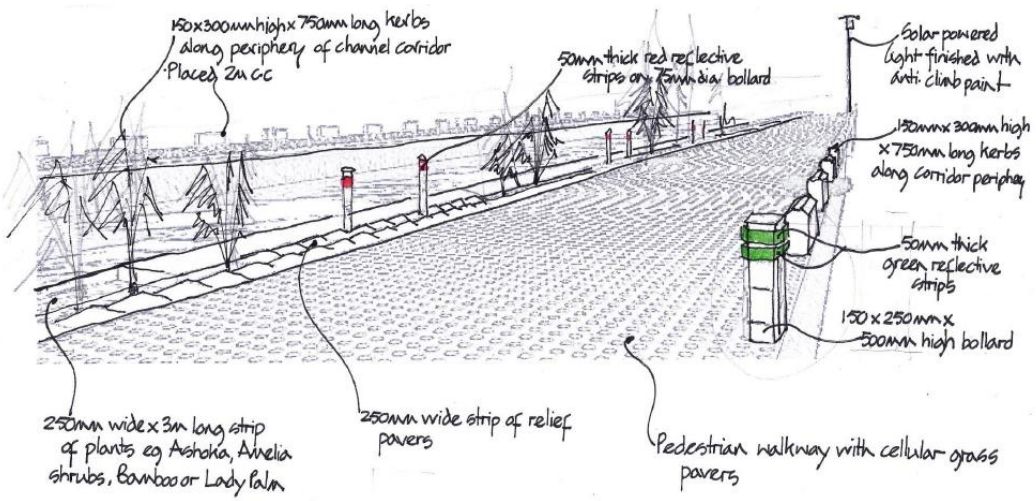


Figure 7-22: Illustration of the Project drainage corridor showing high bollards as markers for channel extent

iii) In order to prevent the use of these access roads by opportunistic motorists such as errant commuter taxi drivers, 300 mm high kerb stones will be placed at intervals on the periphery of the drainage corridor as well as at corridor entrances at major roads.

iv) In order to guard against encroachment of the 3 m access roads along the channels, 500 mm high concrete bollards will be placed at about 25 m intervals along the channel edges.

v) Community sensitization will be done to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.

vi) Community sensitization will be done to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.

vii) Install speed restriction measures including bumps and posted speed limits of 40 km/hr for light vehicles and 30 km/hr for heavy vehicles along access roads to the channels especially when they are traversing communities.

7.4.1.4 Improvement of Community Access across the Channels

As part of the project, footpaths and channel crossings such as culverts and bridges will be replaced or installed in areas where they did not exist to make pedestrian and cyclic traffic much safer for the general population. Although the public in general will benefit, this will be especially relevant for school children who are most prone to accidents while crossing the channels to and from school.

Many pedestrian channel crossings currently in the Project area are unsafe, especially for children. Most channel crossings were improvised by residents and made of scrap metal, truck chassis, concrete, sandbags, timber, boulders or a combination of materials (Figure 7-23). Majority of these structures are in poor condition, posing a health risk since scrap metal or nails in the timber can injure the pedestrians.

Some of the channel crossings are so narrow that people have been reported to fall into the channels, sometimes resulting in fatalities during heavy storms. Consultations with the communities and local leaders in Kansanga (Kansanga Primary Channel) and in Kawempe (Lubigi Secondary Channel 7) pointed out actual locations where people died in the channels during a storm.

However, a few beautiful channel crossings were observed to exist in parts of the Project area such as parts of Secondary Channel 5 in Kansanga Catchment that flow through Heritage International School (Figure 7-24). Crossings such as these are examples that Kampala City can indeed have beautiful channel crossings to enhance the City's look along the storm water channels.

Therefore, as part of the project, channel crossings such as culverts and bridges will be replaced or installed in areas where they did not exist to make pedestrian and cyclic traffic much safer for the general population. Although the public in general will benefit, this will be especially relevant for school children who are most prone to accidents while crossing the channels to and from school.

Figure 7-23: Unsafe drainage channel crossings typical in the dense residential areas

Figure 7-24: Channel access bridges used in Heritage International School along Secondary 5, Kansanga Primary Channel

Enhancement measures:

i) The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. The crossings for only pedestrians should have bollards with reflective strips installed at the ends to strict access to other traffic (Figure 7-22).
ii) Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels.
iii) Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.
iv) Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.

7.4.1.5 Channel Beautification

As a way to soften the hard (concrete) landscape that the drainage corridor will inevitably bring into the neighbourhoods, plants that can fit within a narrow belt with leafy foliage that can grow to a height of 3 m are proposed. These should be easy to maintain and able to flourish under the local weather conditions. These would provide some shade as well as add visual aesthetic to the neighbourhood. They would more importantly act as a visual marker for the channel edge. These would be placed at intervals allowing for servicing of the channels when needed even bending back when more truck clearance is needed.

Landscaping along the channels will significantly improve the aesthetics of the areas along the channels. In addition, vegetation along the channels has the advantage to reducing the amount of silt that would have eventually ended up in the channel, resulting in sediment. In areas where retention ponds will be the selected design option, landscaping will also be done, although at a larger scale to allow for community leisure parks as is the practice in countries such as Australia, USA and UK.

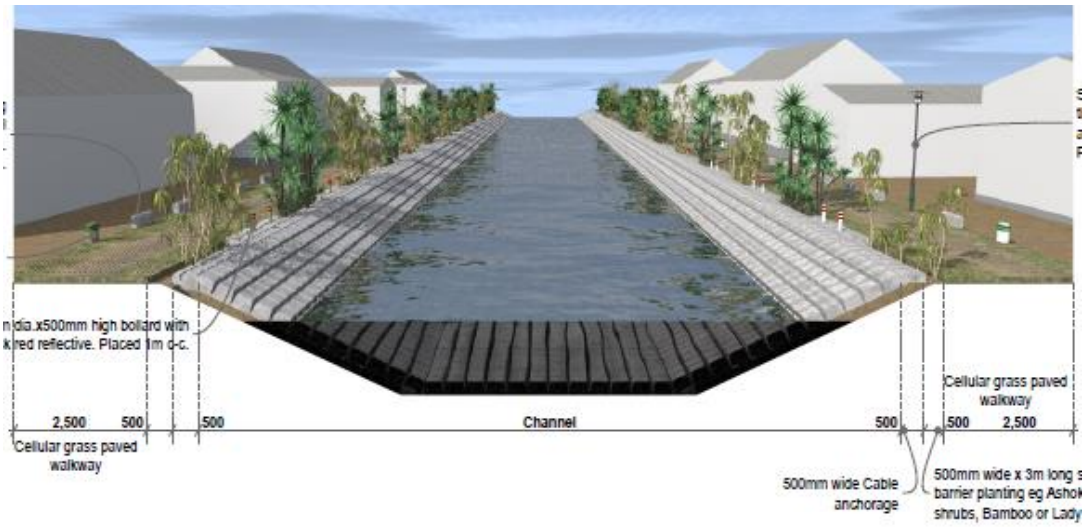


Figure 7-25: Artistic impression for a complete landscaped channel corridor.

Enhancement measures:

i) The Project will make provision for benches and seating areas to allow the community use the space for leisure parks, where feasible.
ii) Inclusion of walk ways, jogging and bike lanes within these landscaped spaces to allow for community utilization of these public spaces.
iii) Use of spaces in selected areas for utilization in specific commercial activities such as tree and flower beds. This can be a source of revenue for KCCA as well as source of employment for the traders.

iv) Provision of trash bins and undertaking of waste management awareness campaigns to reduce or even eliminate the chance of waste ending up in the drainage channels.

7.4.2 Negative Impacts

7.4.2.1 Loss of income from Project-related activities

As the Project draws to a close after the two year construction period, a number of people who had previously been benefiting financially from the Project, such as casual labourers, material suppliers, masons, technical people such as Engineers and Surveyors, among others will lose the financial benefits they had come to rely on.

Impact Significance

The likelihood of the impact is high since the construction phase will naturally come to an end upon completion.

The severity of this impact is assessed as negligible since most people involved in the construction industry are aware of the cycle of construction Projects.

The impact significance is therefore negligible.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures:

i) All people taken on to work on this Project will be informed about its duration and phasing beforehand, so that they can plan accordingly.
ii) The KCCA Supervising Engineers will take note of Consultants, Contractors and sub-contractors that produce quality work, in line with their contracts and industry best practice during the construction phase, and prioritize them for available maintenance work during the life of the Project. This will also serve to ensure that the skills training obtained during the Project construction is taken advantage of.
iii) Unskilled labourers taken on from the local communities surrounding the drainage channels will be kept on for maintenance works of the channel, where possible. This will serve to further increase the sense of ownership of the Project within the local communities, and hence sustainability of the drainage infrastructure.
iv) Where feasible, upon discussion with the local area leaders, committees will be selected along the densely populated sections along the channels with the aim of promoting vigilance against garbage disposal into the channels and vandalism of drainage infrastructure.

7.4.2.2 Risks to Community Health and Safety

The channel designs (Volume 2; Appendices report) propose the widening and deepening of the existing channels in the Project area. While this will improve the hydraulics of the infrastructure and result in better conveyance of storm water with a significant reduction in the occurrence of flooding, there is an increased risk to community safety.

Impact Significance

The likelihood of the impact is low considering the safety measures that have been incorporated into the channel designs as discussed in Section 7.4.1.4. In addition the channels are majorly following the same alignment as the existing ones, and therefore people who live in the area are aware of their existence and have already set routines that incorporate the safety considerations of residing along, or using the routes along the channels. The incorporation of the 3 m access roads for maintenance and channel crossings, will further lower the risk of this impact occurring.

The severity of this impact is assessed as high since the consequence of one falling into a channel 2 m deep, with lining of concrete or stone pitching could result in injuries serious enough to result in temporary or even permanent disability.

The significance of the impact is therefore moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures:

i) The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. The crossings for only pedestrians should have bollards with reflective strips installed at the ends to strict access to other traffic.

ii) Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels.

iii) Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.

iv) Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.

7.5 Impact on biophysical environment

7.5.1 Positive Impacts

7.5.1.1 Restoration and Protection of Wetlands

The current state of wetlands in the City generally, and those within the Project area in particular, is such that the state of encroachment, settlement and reclamation is severe. Majority of the original flood plains have over time been developed into residential and industrial areas, and in this way undermined wetlands and their ecological functions.

This Project area interacts with a number of wetlands as discussed in Section 5.2.1.6. The widening of the existing channel width will require land take, and as such a RAP study was undertaken. This study also helped to identify the number of people that are currently living within areas that were once wetlands. The compensation process for this Project will provide an alternative for people living in the wetlands to leave and settle in areas less prone to flooding. Stakeholder consultations in the various zones/villages within the Project area revealed that many residents are willing to leave the wetlands and flood-prone areas as long as they are given enough money to start up elsewhere.

With encroachers out of the wetlands, KCCA will work together with the Wetlands Management Department to restore and protect the wetlands and in essence their ecological value.

Enhancement measures:

i) The extent of wetlands will be clearly demarcated by beacons to mark the wetlands buffer zone.

ii) A wetlands restoration programme will be embarked upon, starting with the major wetlands in the City.

iii) Incluson of retention ponds within the catchment areas, particularly in wetlands that have been severely encroached on. This will serve to protect the remaining wetlands in the respective identified locations.

iv) The Project monitoring Programme will include an annual assessment of the functionality of wetlands, and in this way a status of the wetland restoration exercise.

v) KCCA will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the drainage channels in this Project will have an impact on the downstream receiving bodies. In particular KCCA will:

- Tailor any developments in the City in line with the existing wetland management plans and in close consultation wit NEMA and WMD.
- Consult WMD and NEMA before approving any developments in demarcated and non-demarcated wetlands. Close cnd indiscriminate application of a stringent system of approval will greatly minimize the loss of wetlands to developers.
- Partner with the NEMA and WMD on regular sensitization of people in Kampala on the benefits of protecting natural wetland systems, and the dangers of destroying the same.
- Partner with the NEMA, WMD and in effect the Environmental Police attached to these Institutios to regularly monitor the demarcated sections of wetland so as to dissuade encroachment on wetlands. Since KCCA has a presence in most parts of the City, with the Divisions, Councils and Villahe leadership, it is possible to closely monitor any new developments in wetlands before serious damage is done.

7.5.2 Negative Impacts

7.5.2.1 Air Pollution

One of the important elements of the channel maintenance will be de-silting and dredging of the channel to ensure that the drainage system infrastructure is always in good working order, especially during the rainy seasons. One of the reasons that the channel designs provided for wide channels is such that de-silting of the channels could be made mechanised in many areas. This will result in the drainage channels being more effectively cleaned, to sustain improved water flow with reduced risk of culvert blockage by silt and gabbage. Sources of air emissions are loaders and heavy trucks used in maintaining the drainage channels, as well as the graders that may be used to maintain access roads.

Exhaust and fugitive dust emissions from the trucks loading away the silt and garbage from the channels willimpact on the communities along the channels. Residential and commercial areas along the channels and communities along the silt and gabbage/waste haulage routes will be the most adversely affected by such exhaust emissions.

Impact Significance

The likelihood of occurrence of this impact is high as a result of truck movement while carrying out maintenance activities, especially in the busy and densely populated commercial and residential neighbourhoods within the Project areas. Most of these areas have unpaved roads which will be used as access roads to the channels.

Baseline air quality measurements in Section 5.2.1.4 showed that the environment within the Project area is generally pristine. However, the severity of the impact is assessed as low considering the localised and brief nature of the impact.

Therefore the impact significance is minor.

Impact Severity	Impact Likelihood			
	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) The vehicles will be switched off when not in use so as to minimize the release of fugitive emissions;
ii) The vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimise potential emissions.
iii) Trucks carrying away the dredged silt and garbage from the channels will drive at controlled/reduced speed, especially in busy residential and commercial areas, to avoid spillage of the silt and garbage onto roads;
iv) Heaps of the garbage and silt from the channel will not be piled near the channels since this is a potential source of dust in dry seasons;
v) Vegetation clearing along the channels will be limited to the minimum required so as to minimise exposed areas and vegetation removal;
vi) There will be no open burning of waste from the channels as is being currently done.

Adoption of the above mitigation measures will reduce impact severity to “negligible” level resulting in a residual impact of minor significance.

7.5.2.2 Disturbance due to Noise Pollution and Vibrations

Vehicles and machinery used during maintenance works will generate noise and vibrations. Such noise will cause disturbance in the Project area. Some sections of channels are located near schools and health centres and maintenance activities occurring during school term can contribute to interruption of the school activities and disturbance of patients in clinics and health centres. The noise and vibrations will be from activities that will be confined to daytime hours when potential for disturbance is less.

The receptor sensitivity for this impact will vary with location since some areas are densely populated while others are not-so densely populated, some areas are within industrial parks such as Ntinda Industrial area, and still others are near schools and health centres (clinics).

It is expected that this impact will occur during both the O&M phase, although with considerably reduced intensity as compared with the construction phase because of the routine nature of maintenance works.

Impact Significance

The likelihood of the impact occurring is high, considering that the channels within this Project scope are located mostly within residential and commercial areas.

The severity of the impact is assessed as low, considering that the baseline measurements for noise in Section 5.2.1.5 showed that 80% of the locations sampled within the project area had ambient noise levels above the national limit. The results of the baseline studies indicate that maintenance activities during day time would not greatly impact on the surrounding environment.

Therefore the impact significance is minor.

Impact Severity	Impact Likelihood

	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) The Contractors and workers should be especially mindful when carrying out construction near sensitive receptors such as schools, clinics and places of worship.
ii) Maintenance activities will be limited to daytime, especially in residential areas to minimize disturbance of residents.
iii) Regular care and maintenance of vehicles and equipment must be undertaken to ensure they run smoothly so as to minimize emissions of noise.
iv) Project machines and vehicles will be turned off when not in use.
v) Should noise complaints be received, noise monitoring will be undertaken by the contractor and if measured noise levels exceed legislative limits then measures will be taken to reduce the noise at source or through attenuation. In addition, KCCA will liaise and work with the affected receptors to determine a mutually acceptable way to proceed.

Adoption of the above mitigation measures will reduce impact severity to "negligible" level resulting in a residual impact of minor significance.

7.5.2.3 Improper Management of Waste from Channel maintenance

Waste during the O&M phase will be generated as a result of dredging of silt and garbage from channel cleaning. Slashing of grass and nearby shrubs will also be a source of waste. Improper management of this waste could have adverse impacts on the environment, resulting in soil and water contamination, as well as damaging visual aesthetics due to littering or heaps of collected garbage near the channels.

Impact Significance

The likelihood of this impact occurring is low because one of the causes of the current garbage problem in the channels is that lack of access roads to collect and remove what is deposited by the channels' edge after cleaning. This Project design provided for 3 m access road on either side of the channel to solve this problem.

The severity of the impact is high because if not well managed, the generated waste can have adverse impact on public health, air quality, soil, water and hence ecology.

Therefore the impact significance is moderate.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) A waste management plan will be developed by the Maintenance Contractors, and approved by KCCA to ensure that measures for handling all operation and maintenance waste (dredged material and waste debris) are in place. The Contractor must dispose of waste to a licensed area/landfill. Waste collected downstream of industries of areas identified to be 'at risk of

having hazardous waste' should have their silt testes, and if found to be hazardous, disposed of in an appropriate manner by a licenced hazardous waste handler.

ii) The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reduce, reuse and recycle. This shall be implemented by use of accurate estimates of dimensions and quantities of materials required, use of durable materials that will not require replacement often, providing proper facilities for handling and storage of construction materials to minimize waste by damage.

iii) Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage.

iv) Waste collected from the channels as wet earth materials shall be temporarily stockpiled at a gazetted location around project site to drain before they are transported to the final disposal site. Litter formed of plastic waste and garbage will be transported to Kitezi for for sorting and reused or disposed of on a regular basis. This is consistent with the plans to transform Kitezi as a temporary holding facility for sorting waste before they are transmitted to Dundu landfill.

Adoption of the above mitigation measures will reduce impact severity to "low" level resulting in a residual impact of minor significance.

7.5.2.4 Impact on water resources and receiving habitat

Improved drainage channels result in increased efficiency of conveyance for stormwater from the respective catchments. Changes in hydraulic efficiency of storm water collection systems with improved channels increase the velocity of flow. Although this is the primary benefit of the Project, it also has the implication of increased volume of water into the receiving wetlands, as well as sediment and garbage into the receiving wetlands. This reduces the effectiveness of the wetlands to undertake their functions, including the critical one of water quality improvement before the storm water finally joins the open water bodies.

Impact Significance

The severity of this impact is assessed as high due to the increased pressure on the already degraded wetlands in Kampala City in which the channels flow and importance of receiving water bodies to the survival of the ecosystem. The impact has a high likelihood of occurring if the project implemented.

The significance of the impact is therefore major.

	Impact Likelihood			
Impact Severity	None	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible – Minor	Minor
Medium	Negligible	Minor	Minor – Moderate	Moderate
High	Minor	Moderate	Major	Major

Mitigation measures

i) The quantity and quality of stormwater reaching the channels must be reduced within the catchment. Implementation of an integrated catchment management plan (ICMP) would be an effective undertaking. Thus KCCA will implement an ICMP that includes:

- Encouraging rainwater harvesting: temporary storage of excess runoff so that release of runoff from properties during a storm is controlled. This will be done by development of guidelines to encourage rainwater harvesting, particularly for new construction projects in the City.

- Greening of yards/compounds rather than paving by impervious surfaces.
- Promoting water use efficiency.
- Improved sanitation systems.
- Upgrading tertiary drainages and community accesses.
- The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle.
- Strict demarcation and protection existing wetlands in Kampala City.
- Provisions to be made for floodplain zoning and regulation for land use changes – some areas will be prohibited for developments and left out for flood control.
- Provisions to be made for development of a compatible and coordinated storm water drainage system in Kampala City.

ii) The designed channel corridors need to be protected from encroachment.

iii) The channels must be regularly and adequately maintained – including replacement of damaged lining, vegetation clearing, de-silting, garbage/debris removal and dredging.

iv) KCCA will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the drainage channels in this Project will have an impact on the downstream receiving bodies. In particular KCCA will:

- Tailor any developments in the City in line with the existing wetland management plans and in close consultation wit NEMA and WMD.
- Consult WMD and NEMA before approving any developments in demarcated and non-demarcated wetlands. Close cnd indiscriminate application of a stringent system of approval will greatly minimize the loss of wetlands to developers.
- Partner with the NEMA and WMD on regular sensitization of people in Kampala on the benefits of protecting natural wetland systems, and the dangers of destroying the same.
- Partner with the NEMA, WMD and in effect the Environmental Police attached to these Institutios to regularly monitor the demarcated sections of wetland so as to dissuade encroachment on wetlands. Since KCCA has a presence in most parts of the City, with the Divisions, Councils and Villahe leadership, it is possible to closely monitor any new developments in wetlands before serious damage is done.

Effective adoption of the above mitigation measures will reduce impact severity to “low” level resulting in a residual impact of minor significance.

7.6 Cumulative impacts

The proposed project will potentially result in an additive effect on the impacts. Cumulative impacts are socio-economic and environment effects which result from incremental impact of the project when added to other past, present, and reasonably foreseeable future actions. This Project is part of the second phase of the Kampala Institutional and Infrastructure Development Project (KIIDP). Under the KCCA Infrastructure development component, the Phase 2 of KIIDP will seek to construct and upgrade identified roads and junctions and drainage channels that are central to enhancing mobility and reducing flooding thereby increasing the useful life of city infrastructure.

Thus cumulative impacts will be contributed by those projects within Kampala city whose development activities overlap both spatially and temporary with this Project. Such projects will include routine city infrastructure maintenance, other projects within KIIDP Phase 2, national infrastructure development projects (for example the Northern Bypass, Entebbe Express Way, Southern Bypass, and Standard Gauge Railway) and other private projects.

7.6.1 Magnitude Assessment Criteria

Impact magnitude refers to the amount of change in a measurable parameter or variable relative to the basis of assessment, guidelines or standards. In this assessment magnitude is equivalent to the residual impact. For each of the cumulative impacts considered, the residual impact has already been determined in the construction and operation impacts section of the report.

7.6.2 Duration and Extent Criteria

Duration refers to the length of time over which an environmental impact occurs, while extent is the spatial area over which the effects the Project are measureable. Thus;

- Short, medium, or long-term in duration; and permanent or temporary. Short term effects last less than a year. Medium term effects last more than one year but less than the 10 years while long-term effects last more than 10 years.
- Affecting a local scale (within 1 km of the proposed site) and regional scale is beyond 1 km.

7.6.3 Ranking of Cumulative Impacts

Ranking of the cumulative impacts based on both the attributes as well as spatial and temporal overlap yielded a scale of low, medium or high as presented in Table 7-2 and Table 7-3.

Table 7-2: Ranking of impacts based on Impact's Attributes

Duration	**Magnitude**	**Extent**	
		Local	Regional
Short term	Minor	Low	Low
Short term	Moderate	Low	Medium
Medium term	Minor	Medium	Medium
Medium term	Moderate	Medium	Medium
Long term	Minor	Medium	Medium
Long term	Moderate	Medium	High

Table 7-3: Ranking of impacts based on spatial and temporal overlap

Temporal overlap	Spatial overlap of effects		
	None	Partial	Complete
Never/Rarely	Low	Medium	Medium
Sometimes	Low	Medium	High
Often	Low	High	High

7.6.4 Assessment of Cumulative impacts

The assessed cumulative impacts associated with past, proposed and foreseeable future activities in the project area include;

- Pressure on local resources from the influx of job seekers and associated rise in demand for services and resources
  The construction works will attract a number of job seekers both skilled and unskilled into the project area. However, the influx of workers is likely to be amplified by the implementation of other projects that share the geopgraphical area, with equivalent of ven more demand for workers. These may include the implementation of Batch II roads and junctions, as well as the construction of the Southern Bypass and Kampala-Jinja Expressway that are in some cases routed through common areas such as Kinawataka wetland.

  The influx of workers may exert considerable amount of pressure on the locally available services and resources including hospitals, accommodation, water etc. This could result in

relative increase in the commodity prices and therefore increase of living for the host communities.

The impact magnitude is assessed as moderate considering short-medium term duration of the project activities. Besides, some of the sections where different projects overlap such as Kinawataka wetland are already overpopulated with slum dwellers which may reduce on the magnitude of impact – given that some of the inhabitants could serve as labourers on these projects.

- **Severity of access and increase in traffic congestion**

  As already discussed in Section 2.10 of this report, KCCA is undertaking a number of Projects including those aimed at improving roads and road junctions. These improvements are expected to result in less congestion in different parts of the City. Coupled with the development projects from other institutions such as UNRA and Standard Gauge Railway which could be implemented around the same time period, the traffic flow is likely to be even more constrained. Equally, access to properties and public service centers such as health units and schools as well public worshiping areas could be severely affected. Some of the sections anticipated to be severely affected include Nabweru road crossing at Nakamiro channel, Kinwataka wetland, and Lubigi Primary channel, among others.

  The cumulative impact on traffic and accessibility around the project areas is short-term and has been assessed as moderate although it could stretch to areas beyond the one kilometre radius.

- **Water resources impacts (both quality and quantity)**

  The impact of this Project on water resources is such that channel conveyance of storm water will greatly increase as a result of channelization. The planned Projects by KCCA, UNRA and SGR in the Project Area will result in increased paved area, and hence higher volume of storm water ending up in the drainage channels, and ultimately the receiving streams.

  In addition, multiple excavation activities in the same project areas could elevate levels of turbidity along the affected channels. This could adversely impact on the aquatic fauna downstream. The cumulative impact of all the planned projects is direct, medium term.

- **Noise, vibration and air quality impacts**

  The cumulative impact of noise, vibration and air quality impacts will result from the multiple sources on the different projects being implemented in the same location at the same time. The impact sources may include heavy trucks, stationary generators, excavators, compactors; jumper compactors, wheel loaders, etc. Air quality impacts will also be as a result of increased exhaust emissions and dust from construction-related works.

  Large earthworks in the same area, from different Projects will result in impacts that are direct, of moderate magnitude, and local in extent.

- **Increased pressure on, and conversion of, the city wetlands**

  The multiple development projects adversely affect the functioning of some natural wetland systems. The construction of the Standard Gauge Railway and Southern Bypass, Kampala-Jinja Expressway, and Northern Bypass expansion etc, will involve backfilling wetland sections with external materials such as rockfill/hard core, gravel, and stonebase among others. The natural interchange between wetland complexes will be adversely affected and their ability to store stormwater and sequestrate pollutants will be equally degraded.

Meanwhile channelization during the implementation of this project may imply increase in conveyance of water from the catchment, thereby affecting the water table even in the wetland areas. This may also attract settlements and other development activities in the hitherto permanently waterlogged wetland areas and thus exacerbate the degradation of wetland ecosystems.

This impact on wetlands is mostly direct, and is assessed as long term, of moderate magnitude and of regional extent.

- **Employment and contribution to economic growth**
  Implementation of the Priority Drainage Improvement project is expected to create jobs for the local population. The jobs likely to be created include both skilled (engineers, surveyors, environmental and social Specialists, drivers, etc) and unskilled (casual labourers, janitors, flaggers, cooks, etc).

  The implementation of multiple projects creates alternative sources of livelihood for the local population in the project affected areas.

These impacts are predicted on the premise that future developments will actually take place in the City as planned. Considering that some of the planned projects will be implemented by different institutions, the need for harmonised scheduling of the implementation activities cannot be overemphasised. This is part of the recommendations proposed in the mitigation measures hereunder.

Mitigation measures

i) All proposed development projects should be coordinated at the Lead Agencies' level. KCCA should in particular be at the forefront of initiating coordination between the different agencies involved in implementation and monitoring the compliance with the national laws and regulations. Information sharing between the developers is paramount.

ii) KCCA must provide for strict enforcement development control mechanisms in the project affected areas to ensure that no expnasion of settlements, slums and unplanned development projects is allowed in the wetland areas.

iii) Synchronise project implementation schedules especially to ensure smooth implementation without on-the-ground stalemate (especially where different project teams converge on the same location) between the different project implementation teams.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

This section presents the Environmental and Social Management and Monitoring Plan (ESMMP) for the pre-construction, construction and post-construction (operation and maintenance) phases of the Project. The Plan includes details such as the issue to monitor, the indicators, responsibility for collecting and checking data and reporting, costs of implementation (where applicable), responsibility for implementing the action and training or orientation of responsible person (if applicable). It should however, be noted that the costs indicated in the ESMMP are indicative only and the responsible implementing parties such as Contractors, Supervising Consultants, and respective KCCA teams and other agencies responsible for monitoring should prepare budgets to include the aspects covered in this ESMMP. Specifically, the bills of quantity for the tendering process were prepared with aspects of this ESMMP included, to emphasise the importance of incorporating environmental and social safetguards in the Project life cycle. It is also important to note that in order not to dilute or contradict the strong environmental and social protection requirements that may already be set out in any general specification for the works (such as the general specification for roads and bridges if this is used as a basis) but that they compliement and add to the specifications and existing contract requirements.

The purpose of developing the ESMMP is to guide the implementation of enhancement measures for potential positive impacts, and mitigation measures to remove, reduce or offset the identified potential negative impacts that could occur as a result of project implementation. Section 7 details the identified impacts and the recommended enhancement and mitigation measures. All Project personnel have a responsibility for their own environmental performance and compliance with the direction of the ESMMP and national environmental legislation.

Key objectives of the ESMMP are to:

- Facilitate compliance with applicable acts, regulations and guidelines;
- Recognize that social responsibility and environmental management are among the highest corporate priorities;
- Assign clear accountability and responsibility for environmental protection and social responsibility to management and employees;
- Facilitate environmental and social planning through the project life cycle;
- Provide a process for achieving targeted performance levels;
- Provide appropriate and sufficient resources, including training, to achieve targeted performance levels on an on-going basis; and
- Evaluate environmental performance and social responsibility against KCCA's environmental and other policies, objectives and targets and seek improvement where appropriate.

There will also be a need to provide environmental awareness and training to all project personnel. The objective of the environmental awareness and training is to provide personnel working on the Project with:

- An understanding of what their responsibilities are, as outlined in the ESMMP;
- A means of developing a culture of compliance with the Project environmental requirements; and
- A means to improve the environmental awareness of the workforce through the education of Project personnel.

8.1 Institutional Arrangements

8.1.1 Institutional Structure and Responsibilities

Institutional responsibility of implementing this ESMMP will rest with KCCA, having a key role of reviewing consultants' reports for compliance with the ESMMP, among others. Other roles will include:

- Monitoring implementation of mitigation actions by contractors
- Coordinating training and capacity building where planned

KCCA should ensure that all its personnel to be involved in implementation of this ESMMP are adequately qualified and were appointed based on their qualification and suitability for respective roles. There is thus no training provided for them under this ESMMP.

KCCA shall engage Construction Supervision Consultantants who will be involved in the daily supervision of the Contractors implementing the Project, in the respective Project areas. To comply with this ESMMP, the Construction Supervision Consultantants and Contractors will have Environmental and Safety Officers who will undertake environmental supervision during construction. However, the contactor's Environmental Officer will be given environmental orientation relevant to this ESMMP so as to execute required environmental supervision roles by the consulting environmental officer.

8.1.2 Monitoring and Reporting Arrangements

Monitoring will verify if predicted impacts have actually occurred and check that mitigation actions recommended in the ESIA are implemented and their effectiveness regularly monitored. Monitoring will also identify any unforeseen impacts that might arise from project implementation.

a) Who monitors and how

Monitoring will be undertaken by KCCA and Environmental Officers who represent NEMA at local administrative level. Monitoring by NEMA in this case can be considered "third party monitoring" but this is its regulatory mandate according to Sections 6 and 7 of the National Environment Act (Cap 135). Considering that sectiosn of the Project route are within wetlands, or will affect wetlands that are downstream of the Project area, the Wetlands Management Department (WMD) will also be involved in Project monitoring.

Another government agency that may undertake "third party monitoring" is the Occupational Health & Safety Department in Ministry of Gender, Labour & Social Development (MGLSD). This unit has authority to inspect any facility for compliance with national requirements on safety in workplaces. The project shall make no funding to MGLSD since this is provided for in its annual budget.

Monitoring will be done through site inspection, review of grievances logged by stakeholders and *ad hoc* discussions with potentially affected persons (construction workers, residents near the drainage channels or along the access roads used by Project vehicles). At each monitoring, a discussion with a chairperson of environment committee of the area's local council (LC) could provide insight into views and grievances the community has about the project.

b) Frequency of monitoring

Monitoring frequencies vary between the responsible agencies, with some effectively carrying out monitoring activities monthly over the construction period.

c) Audits

Audits will be necessary both during construction and project operation. While construction audits will aim to verify compliance to impact mitigation requirements, post-construction audits are a regulatory requirement within 12 months and not more than 36 months after completion of

construction, according to national EIA Regulations, 1998 Section 31(2). Both construction and post-construction audits can be conducted internally (by KCCA) or by a consultant hired by KCCA.

d) Reporting

Concise monthly monitoring reports should be compiled by KCCA and shared with any interested stakeholder. Construction and post-construction phase auditing should culminate in reports that KCCA shall share with World Bank (the Development Partner), NEMA or other interested stakeholders. Note that while KCCA is under no obligation to disclose construction phase audits, annual post-construction audits must be submitted to NEMA as a regulatory requirement as per Section 31(2) of National EIA Regulations, 1998.

The Contractor will be directly supervised by, and report to the Construction Supervision Consultantant. The Construction Supervision Consultantant will in turn be supervised by, and report to the KCCA Project Team.

8.1.2.1 Responsibility of KCCA

As the developer, KCCA will play a major role in ensuring the ESMMP is implemented. KCCA will assume the responsibility for ensuring that the environmental management measures contained in this programme are implemented during the pre-construction, construction and post –construction (operation and maintenance) phases of the project.

KCCA is involved in many projects, funded by various sources such as World Bank and Government of Uganda, among others. The institutional staff is also involved in day-to-day activities of managing the City's environmental and sanitation activities. This may result in a considerable amount of workload on the workers. However, KCCA recruited the Specialists to manage the KIIDP II project, to which priority drainage improvement is part. These specialists are supported by Project and Functional Officers. In particular, the Environmental Specialist and the Social Development Specialist have, in coordination with the Engineers and general project team, successfully managed safeguards requirements in the implementation of Batch I roads and junctions. With Batch I roads and junctions works coming to an end, it is expected that the Project Team will divert all the effort with experience and lessons learnt to Batch II and Priority Drainage Improvement. The implementation of drainage improvement is going to be phased, which reduces pressure on the staff.

Specifically, KCCA will ensure that:

- There is minimum disruption to the lives of local residents within the Project area;
- The requirements for environmental and social safeguards, as provided for in ESMMP are integrated into the bidding documents to ensure that the Contractors adequately prepare to include these in their schedules during Project implementation.
- On appointment, all Consulting and Contracting companies operating on project sites receive a copy of the relevant Project EMPs, as well as the NEMA Approval and various permit conditions.
- The responsibility for implementing and complying with the conditions of the ESMMP forms part of the conditions of appointment of all Consultants and Contractors throughout the life of the project;
- Independent environmental experts are appointed to audit the implementation of, and compliance with, the ESMMP and monitoring plan, as well as the NEMA Approval conditions on an annual basis; and the independent environmental audits, together with other relevant monitoring information, are made available to the public, throughout the life of the project, summarized in lay person's terms and in a culturally accessible manner.
- A formal senior management review of environmental management performance is undertaken on a monthly basis for the first one year, and quarterly basis throughout lifespan

of the project. Senior management responsibility will include the review and approval of any proposed measures to improve environmental performance.

- Training and awareness creation in environmental and social management and the mitigation of impacts are provided to KCCA Project staff, to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally and socially responsible manner.
- The site and activity managers notify the Environmental, Health and Safety (EHS) Manager immediately when environmental or health and safety incidents occur. If the breach is a part of a permit or license condition, the EHS Manager will inform the responsible authority within 48 hours.
- There is availability of the human and financial resources needed to conduct all environmental management, mitigation and monitoring activities throughout the pre-construction, construction and post-construction (operation and maintenance) phases. As necessary, but primarily during construction, this will include the investment of capital to ensure that environmental mitigation measures such as pollution control equipment are integrated into various project components.

8.1.2.2 Responsibility of the Construction Supervision Consultantant

The Supervision Consultants to whom work is outsourced during project implementation will be subjected to the following responsibilities:

- Review project design, contractor's contract, BOQ and all other project documents like the ESMP, ESIA report, NEMA project certificate conditions, RAP as to familiarize with as to build up an additional mechanism for enforcing compliance as per those in contract.
- The Supervising Consultant will ensure that contractors familiarize themselves with the environmental and social management framework for the project sites and activities.
- Review and approve Contractor's plans as required in the above documents like; EHS Plans, Waste Management Plan, Traffic Management Plan, Emergency Response Plan, Gender Management Plan, Erosion and sediment control plan, Decommissioning and Restoration Plans of different sites; among others.
- Follow up on Contractor's obligation in acquiring the various permits in relation to the project works which then will be verified like; Surface Water abstraction permit, Wetland use permit, Permit for demolition of existing structures, Permit for excavation, Permit for hoarding and scaffolding, Work registration permit.
- Monitor the Contractor's performance in EHS aspects, particularly in regards to the above mentioned plans; using the safeguards documents provided by KCCA and NEMA, as well as permits from other Lead Agencies, using the safeguards documents provided by KCCA and NEMA, as well as permits from other Lead Agencies.
- Ensure that all contractors and their subcontractors receive basic training or are sensitized on environmental and social matters, including acceptable conduct, storage and handling of potentially hazardous substances, waste management, and prevention of pollution of natural resources.
- Receive daily, weekly and monthly reports from the Contractor on EHS aspects, and furnish KCCA with the information during monthly meetings or site visits. Any urgent issues will have

to be reported to KCCA immediately to allow appropriate timely action to be implemented.

- Prepare the environmental supervision statement and also approval of invoices or payments with consideration of EMP performance.
- Regular engagements with the local communities to ensure continued social acceptance in the areas where the Contractor is in operation, and also to ensure that Contractor adheres to the recommendations made in this ESMMP.
- In case of any corrective actions, instruct the contractor to correct within the timeframe determined as per contract. If there is breach of contract or strong public complaints on contractors environmental performance, the Supervision Consultants is obligated order contractor to correct, change or stop the work, reporting to relevant agencies and the KCCA;

8.1.2.3 Responsibility of Contractors

Contractors to whom work is outsourced during project implementation will be subjected to the following responsibilities:

- All contracting companies will receive a copy of the Project design, BOQ, ESMMP, ESMF, RPF, ESIA, NEMA Approval Conditions, and RAP and any other relevant documents citied out in the contracts contract as to familiarize with as to build up an additional mechanism of compliance.
- Develop their own contractor's ESMP and EHS Plans, including among others, Waste Management Plan, Traffic Management Plan, Emergency Response Plan, Gender Management Plan, Erosion and sediment control plan, Decommissioning and Restoration Plans of different sites and OSH Policy.
- Acquire the various permits in relation to the project works like; Surface Water abstraction permit from DWRM, Wetland use permit from NEMA, Permit for demolition of existing structures, Permit for excavation, Permit for hoarding and scaffolding from KCCA, Work registration permit from OHS, among others
- Prepare daily, weekly and monthly reports on EHS aspects, and furnish the supervising consultant with the information during wekkly and monthly meetings or site visits.
- Ensure that all contractors' workers including those of the subcontractors receive basic training or are sensitized on environmental and social matters, including acceptable conduct, storage and handling of potentially hazardous substances, waste management, and prevention of pollution of natural resources. Training given will be facilitated by the contractor (basing on the BOQ training cost) through the EHS Manager and all staff will be made aware of where detailed information relating to any aspect of the ESMMP or environmental and social requirements can be obtained.
- Regular engagements with the local communities to ensure continued social acceptance in the project scheduled work areas.
- It is the responsibility of the contractor to bring to the attention of the Construction Supervision Consultant and KCCA, through the EHS Manager, any environmental incident or breach of the conditions of the ESMMP, immediately for severe incidents or within 8 hours of minor incidents.

8.1.2.4 Responsibilities of the Relevant Lead Agencies

Agencies such as NEMA, WMD, MGLSD, Office of CGV, will be involved in the various phases through the life of the Project as proposed in the ESMMP. The responsibilities of each respective agency will be those that are within their mandate, and as such, no extra costing has been included in the ESMMP since it is expected that their annual operational budgets will be made to include the required works for this Project. For this reason, KCCA should regularly update the respective lead agencies with the Project progress, and challenges and opportunities presented. Some of the responsibilities will include:

- NEMA
  - Review ESIA and recommend conditions that will have to be fulfilled to ensure Project success and sustainability.
  - Adherence to national standards for air quality, noise, waste disposal, and others regarding environmental protection.
- WMD
  - All matters regarding wetland protection and restoration.
- MGLSD
  - All matters regarding community, public and occupational health and safety.
- Office of CGV
  - All matters regarding resettlement and compensation as required by the Project.

8.2 Review and Improvement of ESMMP

The Project Operations Manager, together with the Project EHS Manager will review the ESMMP, its operation and effective implementation at least once every three months to ensure that it is still applicable to the existing risks. Between the scheduled reviews, a register of issues will be maintained to ensure that issues raised by internal or external personnel associated with the Project is recorded.

The purpose of the review is to ensure that the ESMMP is meeting the requirements of the standards, policies and objectives and if not, to amend the ESMMP to address any short comings. The review will consider:

i) Site personnel comments;
ii) Audit findings;
iii) Environmental monitoring records;
iv) Community complaints;
v) Details of corrective and preventative actions taken;
vi) Incident reports;
vii) Changes in organization structures and responsibilities;
viii) The extent of compliance with objectives and targets; and
ix) The effect of changes made to environmental standards and/or legislation.

Acting on the findings of the review, the ESMMP will review the various policies and objectives and approve any changes.

8.3 Environmental and Social Management and Monitoring Plan

This section provides the management and monitoring measures as identified from the enhancement and mitigation measures proposed. It should be noted that these measures will be incorporated into the bidding documents, and care taken not to dilute existing requirements of the bidding documents but add requirements that are not already covered. The measures should be used as a guide in the preparationof Employers Requirements in the bidding documents.

The numbering style in the table under sub section 8.3.1 below is consistent with Chapter 7 of this report and therefore begin with 7.1.1, primarily to ensure easier follow up by readers

8.3.1 Pre-construction Phase

ESIA Reference section and Impact	Mitigation commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
7.1.1 NEGATIVE IMPACTS – SOCIO-ECONOMIC ENVIRONMENT							
7.1.1.1 Land take / Involuntary Resettlement	i) All efforts will be made to avoid loss of structures especially by optimising the re-alignment options for the least PAPs undertaken in consultation with the affected people.	Design options with the least possible number of people affected are selected	Number of Project Affected Persons (PAPs)	Prior to commencement of construction.	Project Design Consultant	KCCA Engineering and Technical Services Directorate	To be determined by the findings of the Resettlement Action Plan (RAP) study
	ii) A Resettlement Action Plan will be developed to guide the compensation and resettlement process in line with Ugandan laws. The Plan will also be developed in accordance with World Bank OP 4.12 for Involuntary Resettlement.	Equitable compensation to every PAP in accordance to Ugandan laws and World Bank OP 4.12 for Involuntary Resettlement.	Progress of compensation exercise. Number of complaints registered about inequitable compensation by PAPs.	Prior to site handover to Contractor	KCCA Project Team	KCCA Engineering and Technical Services Directorate Chief Government Valuer (CGV) Independent Hired External Monitor	To be determined by the findings of the Resettlement Action Plan (RAP) study
	iii) Timely sensitizations and consultations with affected persons will be done.	Awareness of Project and land take requirements by all potential PAPs	Number of residents in Project area unaware of Project and land take requirements and RAP process. Number of complaints registered about lack of Project information by local communities in Project areas.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Respective KCCA Urban Division Office	Covered in costs for the RAP study
	iv) In line with World Bank OP 4.12, a Grievance Mechanism will be developed to guide any unsatisfied or disgruntled persons during or after the compensation process, as a measure to minimize the severity of the impact of involuntary resettlement.	A grievance mechanism in place to ably receive, follow up and address complaints from aggrieved PAPs and community residents	Number of residents in Project area unaware of Project and land take requirements and RAP process. Number of complaints registered about lack of Project information by local communities in Project areas.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Respective KCCA Urban Division Office	Covered in costs for the RAP study
	v) KCCA, as the Project developer, will provide adequate and fair compensation (as approved by the Chief Government Valuer) to the project affected persons.	Equitable compensation to every PAP in accordance to Ugandan laws and World Bank OP 4.12 for Involuntary Resettlement.	Progress of compensation exercise. Number of complaints registered about inequitable compensation by PAPs.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Chief Government Valuer (CGV) Independent Hired External Monitor	To be determined by the findings of the Resettlement Action Plan (RAP) study

ESIA Reference section and Impact	Mitigation commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	vi) Clear guidelines will be developed to assist any affected community members identified as vulnerable during the RAP process.	All vulnerable PAPs are given adequate assistance to cope with the project impacts, particularly resettlement	Record of all vulnerable PAPs.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Independent Hired External Monitor	To be determined by the findings of the Resettlement Action Plan (RAP) study
	vii) Sufficient forewarning to communities in the Project area of specific dates when activities will take place and regular updates of any changes will be undertaken.	All PAPs and community members aware project timelines, especially effect of the eviction notice	Number of residents in Project area unaware of Project start date and demolition timelines Number of complaints registered about lack of Project information by local communities in Project areas.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Independent Hired External Monitor	Included in cost of RAP study
	viii) The Supervising Consultant shall ensure that land take is made only in vanquished[5] wetlands and any design review undertaken does not cause exension of the existing extent of works into intact wetland systems.	Land take limited to vanquished wetland	No. of land parcels in vanquished wetland acquired for the project.	Prior to commencement of construction.	KCCA Project team	KCCA ; Directorate of Public Health and Environment	As part of KCCA's operational budget
7.1.1.2 Disruption of normal routine	i) The people targeted to attend community meetings will be given adequate notice so that they can plan their activities appropriately.	Maximum community participation, with minimum disruption of community members' schedules	Number of complaints registered about poor timing of community meetings.	Throughout RAP Process	RAP Consultant	KCCA Engineering and Technical Services Directorate	Included in cost of RAP study
	ii) The surveyors and valuers will give ample notice regarding the times and dates in which they will be in a given location within the Project area, so that people of interest are aware of the progress, and are available at the time.	Surveyors and Valuers work with the knowledge and consent of the respective PAPs	Number of complaints registered about PAPs being unaware of Surveyors and Valuers presence on their property at the time of property surveys.	Throughout RAP Process	Surveying and Valuation Consultants	KCCA Engineering and Technical Services Directorate	Included in cost of RAP study
	iii) The meetings will be held in locations that are easily accessible and close to the targeted community members so that the least inconvenience is subjected.	Maximum community participation, with minimum disruption of community members' schedules	Number of complaints registered about poor timing of community meetings.	Throughout RAP Process	RAP Consultant	KCCA Engineering and Technical Services Directorate	Included in cost of RAP study
7.1.1.3 Economic Displacement	i) All efforts will be made to avoid economic displacement especially by optimising the re-alignment options for the least PAPs undertaken in consultation with the affected people.	Design options with the least possible number of economically displaced people are selected	Number of businesses affected by Project	Prior to commencement of construction.	Project Design Consultant	KCCA Engineering and Technical Services Directorate	To be determined by the findings of the Resettlement Action Plan (RAP) study

[5] *The Technical Working Group of the Policy Committee on Environment proposed through the Cabinet Minute 114 (CT 2014) cancellation of land titles in wetlands on public land acquired unlawfully after 1995 to address wetland degradation. However, TWG also proposed that some wetlands be declared "**Vanquished**" and that land titles therein should not be cancelled. The TWG proposed guiding principles for deciding on whether the wetland is vanquished and among other, they (the TWG) suggest that for a wetland to be declared vanquished, it should be providing essential goods and services for public good including waterworks, wastewater treatment facilities, ports, marinas, roads/bridges and electricity power lines.*

ESIA Reference section and Impact	Mitigation commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	ii) A Resettlement Action Plan will be developed to guide the compensation and resettlement process in line with Ugandan laws. The Plan will also be developed in accordance with World Bank OP 4.12 for Involuntary Resettlement. This Plan will take into consideration the compensation for economic displacement.	Equitable compensation to every PAP in accordance to Ugandan laws and World Bank OP 4.12 for Involuntary Resettlement.	Progress of compensation exercise. Number of complaints registered about inequitable compensation by PAPs.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Chief Government Valuer (CGV) Independent Hired External Monitor	To be determined by the findings of the Resettlement Action Plan (RAP) study
	iii) Timely sensitizations and consultations with affected persons will be done, putting into considerations owners of businesses within the Project area.	Awareness of Project and land take requirements by all potential PAPs	Number of residents in Project area unaware of Project and land take requirements and RAP process. Number of complaints registered about lack of Project information by local communities in Project areas.	Prior to commencement of construction.	KCCA Project Team	Directorate Engineering and Technical Services, KCCA Respective KCCA Urban Division Office	Covered in costs for the RAP study
	iv) In line with World Bank OP 4.12, a Grievance Mechanism was developed to guide any unsatisfied or disgruntled persons during or after the compensation process, as a measure to minimize the severity of the impact of involuntary resettlement, in particular those whose businesses will be affected.	A grievance mechanism in place to ably receive, follow up and address complaints from aggrieved PAPs and community residents	Number of residents in Project area unaware of Project and land take requirements and RAP process. Number of complaints registered about lack of Project information by local communities in Project areas.	Prior to commencement of construction.	KCCA Project Team	Directorate Engineering and Technical Services, KCCA Respective KCCA Urban Division Office	Covered in costs for the RAP study
	v) KCCA, as the Project developer, will provide adequate and fair compensation (as approved by the Chief Government Valuer) to the project affected persons.	Equitable compensation to every PAP in accordance to Ugandan laws and World Bank OP 4.12 for Involuntary Resettlement.	Progress of compensation exercise. Number of complaints registered about inequitable compensation by PAPs.	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate Chief Government Valuer (CGV) Independent Hired External Monitor	To be determined by the findings of the Resettlement Action Plan (RAP) study
Total						**UGX**	**Included in cost of RAP Study**

8.3.2 Construction Phase

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
7.2.1 POSITIVE IMPACTS - SOCIO-ECONOMIC ENVIRONMENT							
7.2.1.1 Income to material / equipment suppliers and contractors	I) The Contractors and sub-contractors will purchase materials from licenced quarry sites, to reduce environmental degradation as a result of the project implementation.	Project's material demand does not encourage environmental degradation.	All quarries from which materials (sand, stone) are obtained are licensed by the local authorities.	Before and during construction	Contractor	Directorate Engineering and Technical Services, KCCA	Included in Contractor's cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
7.2.1.2 Employment and Skills Training	I) KCCA will require the contractors to use locally available labour, to the extent possible, depending on the level of skill required Vis à Vis what is available. This will have the advantage of endearing the local communities to the project and further encourage the community to take responsibility in the maintenance of the project infrastructure, especially channel crossings, as well as vigilance against garbage dumping in the channels.	Community members aware of planned project activities at all times. Maximised involvement of local community members during Project construction activities.	Level of local community awareness of project progress status. Record of contractors' employment activities on a monthly basis, including number of jobs created by employment type (skilled / semi-skilled / unskilled); number of jobs by gender, employment type and geographical area; and rate of employee turnover by gender and area.	Before and during construction	Contractor	Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	10,000,000
	II) The Project will present an opportunity to train Ugandans in various fields such as Engineering, Surveying, Project Management, as well as artisans such as masons, and mechanics.	Skills improvement in youths, especially young professionals and artisans	Number of young professionals and artisans receiving on-job training during construction phase.	During construction	Contractor; Supervising Consultant	Directorate Engineering and Technical Services, KCCA	20,000,000
	III) Contractors will be encouraged to pay a "living wage" to all workers.	Improved livelihood of the local community employed	Record of contractors' employment activities on a monthly basis, including; total man hours and wages paid, by employment type, gender and geographical area; and rate of employee turnover by gender and area.	During construction	Contractor	Directorate Engineering and Technical Services, KCCA	Included in Contractor's cost
	IV) The Contractors will be obligated to work within Uganda's labour laws, including restrictions on child labour especially where it can interfere with the child's education.	Operation of works within Uganda labour laws e.g. no employment of children under the age of fourteen (considering the physically demanding activities at a construction site)	Contractor's knowledge of Uganda's employment laws. Adherence of Contractor to Uganda's employment laws.	During construction	Contractor; Supervising Consultant	KCCA / Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	Included in Contractor's cost
	V) It will also be important to manage community expectations regarding employment opportunities to minimize the potential for community tensions and dissatisfaction.	Community members aware of planned project activities and required level of skill for the various activities	Level of local community awareness of project progress status.	Before and during construction	Contractor	Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	Included in 7.2.1.2(i)
7.2.1.3 Benefit to local retail businesses	I) The Construction workforce will provide communities along the drainage channels with a source of income from local purchases from the grocery stores and rentals for accommodation space.	Local communities and businesses benefit from retail purchases made by workers.	Number of local retail businesses/ landlords benefiting from construction workers' related procurement.	Throughout Construction period	Contractor	KCCA / Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	No direct cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	II) Contractors and subcontractors will encourage their workers to support businesses that conduct their businesses in line with national laws and KCCA bylaws and regulations. Quality and safety of products will be advocated for amongst local businesses as this will have the overall effect of improving the standards of the local businesses.	Growth of local retail businesses within Project areas. Improved quality of products from local retail businesses. Improved awareness and consideration for health and safety during the production processes.	Number of registered local retail businesses. Quality of products and health and safety considerations during production processes from local retail businesses.	Before and during construction	KCCA	KCCA / Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	No direct cost
	III) During the sensitization meetings with local communities, the local residents need to be informed about the Project and how their businesses can benefit from the Project.	Growth of local retail businesses within Project areas.	Number of local businesses participating in, and benefitting from the Project.	Before and during construction	Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	KCCA Engineering and Technical Services Directorate	Covered in 7.2.1.2 i)
	IV) KCCA, through the respective Division offices, will monitor the local businesses with the aim of encouraging the local retail business owners to supply the Project workers with the requisite products, in line with their businesses.	Growth of local retail businesses within Project areas.	Number of local businesses participating in, and benefitting from the Project.	Before and during construction	Respective KCCA Urban Division Council (Division Engineer, Ward Administrator, CDO)	KCCA Engineering and Technical Services Directorate	Covered in 7.2.1.2 i)
7.2.1.4 Improvement of other Service Infrastructure	I) A number of service infrastructures such as water pipes that run along or across some sections of the channels will have to be removed and replaced during Project implementation.	Minimization of the risk of exposure of treated water in pipes to contamination from storm water and sewage in channels	Number and location of water pipes passing through the drainage channels	During construction period	KCCA Engineering and Technical Services Directorate	Service infrastructure owner e.g. NWSC, UMEME, Telecommunication companies.	Included in KCCA annual operational budget
	II) Conduits for future service infrastructure projects will be included in the Project scope, for example at culvert road crossings.	No service lines passing through the drainage channels after Project completion	Number and location of water pipes passing through the drainage channels	During construction period	KCCA Engineering and Technical Services Directorate.	Service infrastructure owner e.g. NWSC, UMEME, Telecommunication companies.	Included in KCCA annual operational budget
7.2.2 NEGATIVE IMPACTS – SOCIO-ECONOMIC ENVIRONMENT							
7.2.2.1 Flooding due to Construction Works / Channel Diversion	i) The phasing of construction works will be such that works are undertaken during the dry season to reduce the risk of constrictions in the drainage system during the rainy season. Construction will not be started where critical access roads or channel sections cannot be completed before the start of rainy season and the bidding documents shall reflect this emphasis.	Minimize risk of flooding during construction	Occurrence of flooding in Project area during construction period	Throughout Construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	No direct cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	ii) The Contractors will use best available methods of construction to minimize the risk of blockages and constrictions during construction.	Minimize risk of flooding during construction	Occurrence of flooding in Project area during construction period	Throughout Construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
7.2.2.2 Occupational Health and Safety (OHS) Risks							
7.2.2.2.1 OHS Risks - Sanitation Risk	i) All workers, including sub-contractors and casual labourers, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules.	All workers on site aware of EHS requirements and site safety rules	Records of incidents and accidents on site. Observance of site safety rules by workers. Use of requisite PPE by workers.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
	ii) A licensed hazard material contractor will be engaged to handle sludge from pit latrines that have to be demolished to allow for Project implementation. In addition, content from pit latrines that have been demolished will be isolated to wait for handling by a licenced contractor.	Minimize risk of exposure of workers to hazardous material to ALARP.	Records of incidents as a result of exposure to hazardous material.	Throughout Construction period.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	10,000,000
	iii) KCCA, as the Project Developer, will give ample time to Project affected residents to relocate or have other sanitary units constructed, as required.	Minimize risk of exposure of local community members to hazardous or contaminated material to ALARP.	Number of complaints registered about lack of sanitary facilities by local communities in Project areas (these should be from residents whose sanitary facilities were demolished by the Project).	Prior to commencement of construction.	KCCA Project Team	KCCA Engineering and Technical Services Directorate; KCCA Solid Waste Management Team	Covered in the RAP/ Valuation exercise
	iv) Construction workers will be provided with appropriate PPE to protect them against any infections from working in high risk environments. The Contractor should therefore show how he intends to deal with such areas during the bidding process or as one of the Plans in preparation for undertaking the construction works.	Minimize risk of exposure of workers to hazardous material to ALARP.	Records of incidents as a result of exposure to hazardous material.	Throughout Construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	5,000,000
	v) The Contractor will be required to secure the excavated sites by way of hoarding or installation of barricades to avoid access by the local population.	All the excavated sites are hoarded and barricades are installed and the local population has no access	No of excavated sites and barricaded from community access,	Throughout the Construction phase	Contractor	KCCA, Supervising Consultant	Included in the Contractor's Costs
	vi) Alternative safer access points will be established along with guiding warning signage to guide the communities from the safety hazards	Alternative safer access points are established and the guiding warning signage is in place.	No. of alternative safer access points established,	Throughout the Construction phase	Contractor	KCCA, Supervising Consultant	Included in the Contractor's Costs

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	vii) Almost all the project areas are served with community toilets run by the established User Committees. Since these toilets are run on a business model where users pay a small fee to maintain them, KCCA will allow affected people to use the toilets at the expense of the project for the duration of the construction period	People affected by demolition of toilets are allowed to use community toilets under the auspices of the project.	No of people allowed to use community toilets under the auspices of the project.	Throughout the Construction phase	KCCA, Contractor	KCCA	2,000.000
	viii) KCCA will construct communual toilets strategically located in areas where the Project implementation has resulted in increased pressure on community sanitation infrastructure.	Minimize the likelihood of outbreak of water-borne diseases due to Project implementation	Number and sate of hygiene of sanitation facilities being used by Project workers.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate	100,000,000
7.2.2.2.2 OHS Risks - Construction Activity Hazards	i) Orient all construction workers on safe work practices and ensure that they are adhered to.	All workers on site aware of EHS requirements and site safety rules.	Records of incidents and accidents on site. Observance of site safety rules by workers. Use of requisite PPE by workers.	Throughout Construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
	ii) Safety training will be conducted routinely on how to prevent and manage incidences on site, and measures to protect the general public from construction site hazards.	All workers on site aware of EHS requirements and site safety rules	Records of incidents and accidents on site. Observance of site safety rules by workers. Use of requisite PPE by workers. Response to emergency incidents on site. Availability of first aid kits on the various sites.	Throughout Construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	6,000,000
	iii) All tasks will be performed by the respective qualified and authorised personnel for the particular tasks.	Number of safety incidents on site kept to a level that is ALARP	Records of incidents and accidents on site. Skill of workers observed during implementation of Project activities.	Throughout Construction period.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
	iv) Retro-refelctive OHS signage, reflective warning tape, barricades, and reflective cones will be used to warn off and protect residents, curious passers-by and project employees of dangerous areas such as deep trenches or slippery areas along the channels.	Minimize risk of exposure of community members to safety incidents to ALARP	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout Construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	3,000,000

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	v) Night time lighting will be provided, as necessary in the different Project areas to ensure that staff and the general public are aware of, and protected from construction hazards.	Minimize risk of exposure of community members to safety incidents to ALARP	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout Construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	30,000,000
	vi) The Contractor will inform the affected communities of the timing and duration of the construction activities across access roads and any uncertainties or potential for change. This will serve to keep the neighbouring communities aware of the on-going works, the progress and any issues of community safety to note, such as diversion routes.	Communities in Project areas aware of on-going construction activities and potential risks to community safety.	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout Construction period.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	5,000,000
	vii) Supervision of works will be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work.	All workers on site aware of and observing EHS requirements and site safety rules.	Records of incidents and accidents on site. Observance of site safety rules by workers. Use of requisite PPE by workers.	Throughout Construction period.	Contractor	Supervision Consultant KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost and Supervising Consultant's cost
	viii) Strict instructions will be given for drivers of heavy equipment and delivery vehicles.	All drivers operating Project vehicles and equipment with maximum regard for safety. No incidents or accidents on site, in communities or along delivery routes during Project implementation.	Records of traffic related incidents and accidents on site, in communities, along access roads or major roads during implementation of Project activities. Number of complaints recorded from community members and general public about careless driving by Project drivers.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	ix) Communication line must be ensured between workers and drivers of heavy equipment.	Minimize risk of traffic accidents on site to as low as possible.	Records of traffic related incidents and accidents on site.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	x) Speed limits on access roads for project activities will be 30 km/hr for light vehicles and 20 km/hr for heavy vehicles (Basing on the Traffic and Road Safety (Speed Limits) Regulations, 2004. The Maximum Speed Limit in Urban Areas, Trading Centres and other Built-up Areas is 50km/hr for Heavy goods vehicles, 40km/hr for Tractors and 30km/hr for Engineering plant)	Minimize risk of traffic accidents on site to as low as possible.	Records of traffic related incidents and accidents on site.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	xi) Flagmen and traffic signage will be provided to warn motorists of heavy trucks or machinery turning off and joining the access roads for the project sites.	Minimize risk of traffic accidents on site to as low as possible.	Records of traffic related incidents and accidents on site.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	20,000,000
	XV) The contractor must organise medical services for the employees in collaboration with area health officials.	Provision of adequate and timely medical interventions when required	Records of incidents and accidents on site.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	30,000,000
	XVI) A site hoarding off permit will be acquired by the contractor allowing the contractor to hoard / fence off the open excavated areas.	Minimize risk of accidents on site to as low as possible, particularly from the public.	Records of indicents. Number of complaints from teh general public	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
	XVII) Alternative community access routes to be provided for the general public in areas where exisiting routes are disrupted by construction activities and these will be clearly indicated in the traffic management plan. Particular emphasis to be made in areas near schools, clinics and other such public infrastrusture commonly accessed by the general public.	Minimize the risk of accidents for the general public	Records of indicents. Number of complaints from the general public	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
	xii) The Project Contractors and sub-contractors will be required to provide appropriate PPE for their workers to ensure that any risks are minimized to a level that is As Low as Reasonably Practicable (ALARP).	Use of appropriate PPE by all workers on site.	Use of requisite PPE by workers. Records of incidents and accidents on site.	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in 7.2.2.2.1 iv)
7.2.2.2.3 OHS Risks - Risks Associated with the influx of migrant workers and Social Interaction with	**General Recommendations** i) All Contractors shall be required to develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the Contractor's Human Resource Mannual.	All Contractors have developed guidelines for behavioural conduct, including penalties.	Guidelines for behavioural conduct, and No. of penalties awarded to workers for misbehaviour	Thoughout the preconstruction phase	Contractor	Supervising Consultant, and KCCA	Included in the Contractor's Costs

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
construction workers	ii) Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women;	Workers have been sensitized on proper social behaviour and conduct with regard to community norms prior to starting work – and workers avoid engaging in sexual relations with underage girls and married women;	No. of sensitisation campaigns carried out by the Contractor on proper social behaviour	Thoughout the preconstruction and Construction phase	Contractor	Supervising Consultant, and KCCA	Included in the Contractor's Costs
	iii) In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, establishment of a grievance log book at each project site and suggestion boxes should be established.	Local leadership is always used as a first priority in solving misunderstandings with local communities The Grievance Redress Committees are also used to address arising grievances between workers and between workers and community members. There are different avenues of collecting community grievances including community meetings, a grievance log book and suggestion boxes at each project site.	No. of times the local leadership is involved in addressing the community – workers misunderstandings No. of cases handled by the Grievance Redress Committee, The No. of avenues in place for collecting grievances associated with the project	Preconstruction and construction phases	Contractor	Supervising Consultant, and KCCA	Included in the Contractor's Costs
	iv) Similarly, in liaison with local leaders, contractors should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities	Local communities are prepared psychologically to receive new comers	No. of community engagements with the local communities	Preconstruction and construction phases	Contractor	Supervising Consultant, and KCCA	Included in the Contractor's Costs
	HIV/AIDS i) As a contractual obligation, contractors will be required to have an HIV/AIDS policy and a framework (Responsible staff, action plan, etc.) to implement during Project execution.	No illicit sexual relationships among construction workers and local community. Workers aware of safe sex practices.	Level of social interaction / fraternization between workers and local community. Number of complaints recorded from community members regarding fraternization with Project workers.	Prior to, and throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost. Cost to cover sensitization, free HIV/AIDS testing and counselling, awareness & outreach programs, etc.

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	ii) All construction workers will be orientated and sensitized about responsible sexual behaviour in Project communities.	No illicit sexual relationships among construction workers and local community. Workers aware of safe sex practices.	Level of social interaction / fraternization between workers and local community. Number of complaints recorded from community members regarding fraternization with Project workers.	Prior to, and throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost
	iii) As part of their Corporate Social Responsibility, the Contractor in coordination with KCCA will conduct HIV/AIDS awareness campaigns in the Project areas, particularly in slum areas, to avoid reckless lifestyle and spread of the disease in the area.	No illicit sexual relationships among construction workers and local community. Workers aware of safe sex practices.	Level of social interaction / fraternization between workers and local community. Number of complaints recorded from community members regarding sexual fraternization with Project workers.	Prior to, and throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	5,000,000
	iv) HIV/AIDS policies shall be developed at workplace and Contractors should provide Free HIV/AIDS testing, counselling and condom distribution for both workers and local community;	HIV/AIDS policies are developed at workplace and Contractors provide Free HIV/AIDS testing, counselling and condom distribution for both workers and local community	The HIV/AIDS Policies in place, and the No. of Free HIV/AIDS testing and Counseling events made, frequence of condom distribution.	During Consruction	Contractor	Supervising Consultant, KCCA	
	v) Management of Social bonding at work place: The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. Social bonds are not readily controlled and the permanence of HIV/AIDS transmission makes this particular impact of social bonding both negative and also positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual exploitation can also occur. Thus, the issue of social bonding will be tackled with firmness and fairness, forbidding power relationships, which lead to exploitation of mostly women and children, while encouraging relationships that could lead to permanent situations	The issue of social bonding is tackled with firmness and fairness, forbidding power relationships that lead to exploitation of mostly women and children, at the same time encouraging relationships that may lead to permanent situations	No. of engagements and worker's sensitisation on various issues that also include positive Social bonds	Construction phase	Contractor	KCCA, Supervising Consultant	Included in the Contractor's costs

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	Gender based violence, violence against children and child labour vi) The Contractor will be required to prepare for the approval of KCCA, a Code of Conduct to apply to all employees and subcontractors, and to agree with KCCA the mechanism for enforcing this code of conduct	Protection of women and children's rights by all Project personnel throughout the construction period.	Number of briefings provided and number of campaigns held to highlight issues of Gender based violence, violence against children and child labour, and how and why these must be avoided.	Prior to, and throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contract's cost
	vii) The project contract should be drafted on the backbone of the constitution of Uganda and on the labour and employment Act not with holding the gender policy and other relevant regulations.	Protection of women and children's rights by all Project personnel throughout the construction period.	Number of briefings provided and number of campaigns held to highlight issues of Gender based violence, violence against children and child labour, and how and why these must be avoided.	Prior to, and throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contract's cost
	viii) A clause protecting against gender based violence, violence against children and child labour will be included in the Project Contract, carrying sanctions upon breach of contract like withholding payments by the supervising consultant from the contractor.	Protection of women and children's rights by all Project personnel throughout the construction period.	Number of briefings provided and number of campaigns held to highlight issues of Gender based violence, violence against children and child labour, and how and why these must be avoided.	Prior to, and throughout construction period.	supervising consultant and contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production supervising consultant	Included in project designers cost
	ix) The contractor will be required to train and sensitise all the employees and sub-contractors about his approved and advertised code of conduct clearly spelling out sanctions for noncompliance. Engaging his staff in building a mechanism that streamlines the code of conduct in their worker's association principles.	Zero complaints on Gender based violence, violence against children and child labour	Number of briefings provided and number of campaigns held to highlight issues of Gender based violence, violence against children and child labour, and how and why these must be avoided.	Throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost for Grivence Management
	x) The Contractor will develop, for KCCA approval, a grievance mechanism by which the community can report activity that may be a breach of the code, and to monitor compliance with the code as well as report on any non-compliance.	Zero complaints on Gender based violence, violence against children and child labour	Number of complaints recorded regarding infringement on women and children's rights and timeframe for redress.	Throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost for Grivence Management

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	xi) The contractor will have an orientation on all the labour laws including the child labour law before starting works. The contractor will consult and involve the Division labour officers in each of the divisions to ensure that there is compliance on no child labour during construction of the channels. The contractors human resource department will require an introduction letter from the applicants LC1 (residents village leadership) and birth certificate as additional requirements for job applications.	Protection of women and children's rights by all Project personnel throughout the construction period.	Number of briefings provided and number of campaigns held to highlight issues of Gender based violence, violence against children and child labour, and how and why these must be avoided.	Throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost for Grivence Management
	xii) Local area leaders in the Project areas will be asked to allow time particulary for the discussion of issues related to the Project during their regular village and committee meetings. Women should be allowed to voice their concerns and if necessary, hold focused group discussions to identify and deal with any issues of gender based violence, violence against children and child labour.	Protection of women and children's rights by all Project personnel throughout the construction period.	Number of briefings provided and number of campaigns held to highlight issues of Gender based violence, violence against children and child labour, and how and why these must be avoided.	Throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost for Grivence Management
	xiii) The Construction Supervision Consultant will have a Community Liaison Officer who will be responsible for logging and monitoting the redress of grievances. The Officer will be provided an office, to allow privacy and encourage whistle-blowing such that any vices of Gender-based violence, violence against children. The Grievance Mechanism and Grievance Mechanism Reporting Form is provided in Volume 2; Appendices Report	Prompt redress of any reported grievances.	Number of complaints recorded regarding infringement on women and children's rights and timeframe for redress.	Throughout construction period.	Contractor	KCCA Labour Officers in the Directorate of Gender Community Services and Production	Included in Contractor's cost for Grivence Management
7.2.2.3 Traffic Management ans Safety	i) The Contractor will prepare a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings.	Minimize the risk of traffic disruption and road accidents due to Project implementation as much as possible.	Recorded number of traffic incidents as a result of Project implementation. Incidents of traffic congestion as a result of Project–related activities.	Prior to and throughout construction period.	Contractor; Supervising Consultant; Directorate.Engineering and Technical Services, KCCA	Traffic Police	10,000,000

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	ii) Delivery and storage of materials at the various construction sites should also be organized in a manner to avoid traffic disruption e.g. prior planning of material delivery so as to avoid delivery during the known rush-hours. Material stockpiles near roads tend to narrow the carriageway and cause congestion.	Minimize the risk of traffic disruption and road accidents due to Project implementation as much as possible.	Recorded number of traffic incidents as a result of Project implementation. Incidents of traffic congestion as a result of Project–related activities.	Throughout construction period.	Contractor; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Traffic Police	Included in Contractor's cost
	iii) Drivers will be inducted at the start of the Project, and regularly reminded, about road safety and due diligence to ensure safety of other road users.	Minimize the risk of traffic disruption and road accidents due to Project implementation as much as possible.	Recorded number of traffic incidents as a result of Project implementation. Incidents of traffic congestion as a result of Project–related activities.	Throughout construction period.	Contractor; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Traffic Police	Included in Contractor's cost
	iv) Flagmen will be provided to warn motorists of heavy trucks or machinery turning off and joining the access roads to the project sites.	Minimize the risk of traffic disruption and road accidents due to Project implementation as much as possible.	Recorded number of traffic incidents as a result of Project implementation. Incidents of traffic congestion as a result of Project–related activities.	Throughout construction period.	Contractor; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Traffic Police	Covered in **7.2.2.2.2** (x)
	v) Appropriate safety signs shall be used during construction (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.) during the construction period.	Minimize the risk of traffic disruption and road accidents due to Project implementation as much as possible.	Recorded number of traffic incidents as a result of Project implementation. Incidents of traffic congestion as a result of Project–related activities.	Throughout construction period.	Contractor; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Traffic Police	Included in Contractor's cost
	vi) Night time lighting to be provided, particulary at sections with deep excations to ensure that pedestrians and motorists have good visibility of any construction hazards.	Minimize risk of exposure of community members to safety incidents to ALARP	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout Construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in 7.2.2.2.2 (v)
7.2.2.4 Interference with other service infrastructure	i) Project implementation will be done in close consultation with the respective utility service companies such as NWSC, UMEME and telecommunication companies.	Minimize disruption of respective services in the Project area and beyond.	Recorded number of service infrastructure damaged as a result of Project implementation. Number of complaints recorded from community members regarding interference with service infrastructure due to Project activities.	Throughout construction period.	Contractor KCCA Engineering and Technical Services Directorate.	Respective utility service companies such as NWSC, UMEME and telecommunication companies.	50,000,000

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	ii) All identifiable utility service lines in the right of way will be relocated in the pre-construction phase prior to the commencement of works to avoid interruptions from damage during the construction phase. Interference from service shut-down during the process shall be communicated to the potentially affected communities in advance.	All the utility service lines in the right of way are relocated and communities are informed wll in advance	No. of community engagements made to inform the local communities of the interference.	Preconstruction phase	Contractor, Sub Contractors and the Supervising Consultant	KCCA – Directorate of Gender and Community Developmnt Services, Directorate of Engineering and Technical services	50,000,000
	iii) During construction, the Contractor will have to prepare a work schedule, which will be closely monitored and supervised by KCCA. KCCA will be obligated to inform the service provider whose infrastructure needs to be relocated. The lines of communication between the KCCA Project Manager and the utility owners should be very clear, not only to avoid delays in Project implementation but also to minimize the disruption caused by interference in service provision.	Minimize disruption of respective services in the Project area and beyond.	Recorded number of service infrastructure damaged as a result of Project implementation. Number of complaints recorded from community members regarding interference with service infrastructure due to Project activities.	Throughout construction period.	Contractor ; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Respective utility service companies such as NWSC, UMEME and telecommunication companies.	Included in 7.2.2.4 (i)
	iv) The communities to be affected by any interference in service provision (water, electricity, or telecommunication signals); will be given ample warning and alternatives provided by the service provider, wherever possible.	Minimize the impact of disrupting service delivery to receiving communities. Improve acceptance of the Project in the communities through which the Project will be implemented.	Recorded number of service infrastructure damaged as a result of Project implementation. Number of complaints recorded from community members regarding interference with service infrastructure due to Project activities.	Throughout construction period.	Contractor; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Respective utility service companies such as NWSC, UMEME and telecommunication companies.	Included in 7.2.2.4 (i)
	v) The service utilities relocation cost must to be included in the total project cost.	Services are disrupted for the shortest possible time to minimise the effect on end users.	Availability of funds to conduct relocation of service infrastructure, as required.	Prior to construction	KCCA Engineering and Technical Services Directorate.	Respective utility service companies such as NWSC, UMEME and telecommunication companies.	Included in 7.2.2.4 (i)
	vi) Where the local infrastructure including community access roads is likely to be interfered with, the Contractors will ensure regular community engagements to alert them of the likely temporary blockades and the duration to avoid local outrage and opposition to the project.	Communities are informed timely of the likely interences from the project activities No of complaints from the communities over the interference with the local infrastructure	No. of community engagements held to inform, among others on issues associated with local service infrastructure	During preconstruction and throughout the construction phase	Contractor, Supervising Consultant, and KCCA	KCCA's Directorate of Public Health and Environment, Directorate of Gender and Community Services	Under the Contractor's costing.

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	vii) The Traffic Management Plan shall be prepared with well laid out procedures on shared use of community access roads specifying measures to avoid interruptions during peak hours.	There is a traffic management plan in place and the communities and the contractors' use interests/ rghts are well taken care of	Measures in place to guide shared use of the local community infrastructure	During the Construction phase	Contractor, Supervising Consultant	KCCA's Directorate of Gender and Community Services	Under the Contractor's costing.
	viii) Community members shall, through regular community engagements, be informed of emergence contacts from the Contractor, Consultant and KCCA (the client) for emergence response in case of any incidents such as bursting water pipes and exposure to high voltage power service lines, etc., resulting from the project activities;	Community engagements are undertaken and members are aware of imergency contacts in case of emergencies arising from the project activities	The number of emergence contacts provided to ease quick reporting and emergence response in case of emergencies	During the construction phase	Contractor	KCCA's Directorate of Public Health and Environment, Directorate of Gender and Community Services	Under the Contractor's costing.
	ix) Different avenues for receiving grievances from the local communities shall be established including the grievance book at the project sites and suggestion boxes in open areas. These should be made known to the local communities.	Communities and project workers are aware of the different/alternative avenues of submitting complaints on the project implementation	No. of grievance recording/ registering avenues made available	During the construction phase	Contractor and Supervising Consultant,	KCCA's Directorate of Public Health and Environment, and the Directorate of Gender and Community Services	Under the Contractor's costing.
	x) Mechanisms shall be put in place to handle community grievances in a timely fashion. The Grievance Handling Committee at the Contractor's level and Authority (KCCA) level should be utilised to address these issues.	The Grievance Handling Committees are in place and community grievances are effectively and timely addressed	The Grievance Handling Mechanism at different levels, and; The No. of community complaints/grievances addressed	During the Construction phase	Contractor, KCCA	KCCA's Directorate Gender and Community Services	Under the Contractor's costing.
7.2.2.5 Damage to existing infrastructure	i) Rectification installation of the service infrastructure that intersects with the drainage channels will be planned to take the shortest time possible to minimise disruption of service for the users' communities.	Minimal interruption for the end user	Number of complaints from affected communities Duration of rectification works for installation of service infrastructure	Throughout Construction period	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	Included in 7.2.2.4 (i)
	II) Trucks ferrying materials will be loaded commensurate with the recommended axle load for a given road to avoid or minimize damage.	Damage to road infrastructure kept to a minimum	Failure indicators on road infrastructure used by Project vehicles such as ruts, potholes,	Throughout Construction period	Contractor	KCCA Engineering and Technical Services Directorate Uganda National Roads Authority (UNRA)	Included in KCCA and UNRA annual budgets
	III) Use locally sourced materials, whenever possible, to minimize travel distances and expanse of road damaged.	Damage to road infrastructure kept to a minimum	Failure indicators on road infrastructure used by Project vehicles such as ruts, potholes,	Throughout Construction period	Contractor	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	IV) Some of the roads will be upgraded to allow easy movement of vehicles and transportation of materials.	Ease of transportation for delivery of Project materials	Record of delays in material delivery	Throughout Construction period	KCCA Engineering and Technical Services Directorate	KCCA Engineering and Technical Services Directorate	50,000,000

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	V) The phasing of construction works will be such that the majority of works are undertaken during the dry season to reduce traffic impact on existing roads.	Minimize damage to existing road infrastructure	State of roads commonly used by construction vehicles	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
	VI) Alternatives to disrupted community access routes to be provided, to ensure safety of the general public, particilarly children and old people.	Minimize the risk of accidents for the general public	Records of indicents. Number of complaints from the general public	Throughout Construction period.	Contractor	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Included in Contractor's cost
7.2.2.6 Impact on Physical Cultural Resources (PCR)	i) A Chance Finds Procedure has been developed as part of the Environmental and Social Management and Monitoring Plan, to guide the handling of any 'chance finds' during project implementation.	Identification and proper handling and safe-keeping of any 'chance finds' during Project implementation. Equitable compensation for, and relocation of, all cultural resources in accordance to National laws and World Bank Guidelines (OP/BP 4.11).	Records of any 'chance finds' Identification of any physical cultural resources.	Prior to and throughout construction period.	Contractor; Supervising Consultant; KCCA Engineering and Technical Services Directorate.	Ministry of Tourism, Wildlife and Antiquities	10,000,000 (for chance finds), No known PCRs have beenidentified or confirmed during the RAP study so far
7.3.1 NEGATIVE IMPACTS - BIOPHYSICAL ENVIRONMENT							
7.3.1.1 Soil Erosion and Degradation	i) A Construction Environmental Management Plan (CEMP) will be prepared, including a range of appropriate erosion and sediment control measures to be implemented during the construction of the drainage infrastructure, to minimise the potential for environmental harm on receiving waters.	Minimize risk of soil erosion and degradation. Minimize risk of pollution of receiving streams and aquatic ecology.	Submission of the CEMP, with acceptable soil erosion control measures Implementation of measures in the CEMP Water quality tests to check for Total Suspsended Solids in storm water being conveyed.	Prior to commencement of construction works Throughout construction period. Twice each season, Throughout construction period.	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	ii) Clearance of vegetation will be limited to areas that will be required for construction of drainage channels.	Minimize soil exposure to agents of erosion. Minimize Project footprint to as small as possible.	Number of locations and extent of bare ground beyond that required for construction purposes.	Prior to commencement of construction works	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	iii) Excavation of trenches to construct drainage channels will be done in a phased manner such that soil is not exposed for a long time before the channels are lined, as applicable.	Minimize soil exposure to agents of erosion	Evidence of sedimentation of eroded soil downstream of construction site. Number of complaints from neighbouring communities regarding deposition of eroded soil.	Throughout construction period	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	iv) Excavated material will be collected routinely such that heaps of exposed soils are not left in the Project area for long.	Minimize soil exposure to agents of erosion	Sedimentation of eroded soil downstream of construction site. Number of complaints from neighbouring communities regarding deposition of eroded soil.	Throughout construction period	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	40,000,000
	v) Excavated material will be disposed of in approved locations to control erosion and minimize leaching of hazardous materials.	Minimize soil exposure to agents of erosion Minimize risk of soil contamination	Disposal of excavated material in approved locations. Silt and water quality tests to check for Total Suspsended Solids in storm water being conveyed.	Throughout construction period Twice each season, Throughout construction period.	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate; NEMA	Included in 7.3.1.1 iv)
	vi) Heaps of excavated soil will be covered with tarpaulin to minimize exposure to agents of erosion such as wind and running water.	Minimize soil exposure to agents of erosion	Sedimentation of eroded soil downstream of construction site. Number of complaints from neighbouring communities regarding deposition of eroded soil. Silt and Water quality tests to check for Total Suspsended Solids in storm water being conveyed.	Throughout construction period Twice each season, Throughout construction period.	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	2,000,000
	vii) Planning and management of stockpiles to minimise potential for "wash-out" and generation of sediment-laden runoff during periods of rainfall. Extra caution will be taken at the start of the rainy season by depleting the stockpiles of material and therefore minimizing the potential for "wash-out".	Minimize erosion from stockpiles	Sediment deposition downstream of stockpiles Silt and Water quality tests to check for Total Suspsended Solids in storm water being conveyed.	Throughout construction period. Twice each season, Throughout construction period.	Contractor; Supervising Consultant;	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	viii) The Project will make use of existing access roads to the Project areas to minimize the need to expose soil.	Minimize soil exposure to agents of erosion	Bare ground beyond that required for access to construction sites	Before and throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost

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	ix) Fuel handling and oil spill measures will be implemented to prevent, control and address spills or leaks. Fuel and oil handling will be assigned to trained personnel and procedures for fuel storage, operation of mobile fuel tankers and refuelling areas will be well defined. Impermeable sheets, spill mats, and drip trays will also be provided in the appropriate areas to curb fuel and oil leakage to the ground. All equipment and vehicle repairs will be carried out under shelter to minimize potential soil and oil pollution during rainy seasons.	Minimize risk of soil contamination as a result of oil and lubricant spills.	Location of oil and lubricant spills onsite or downstream of construction site. Water quality tests to check for presence of oils in storm water being conveyed.	Throughout construction period Twice every season, during construction period.	Contractor	KCCA Engineering and Technical Services Directorate	5,000,000
	x) Regular maintenance of operating machinery to keep it in good working condition, and hence minimize oil and lubricant spills.	Minimize risk of soil contamination as a result of oil and lubricant spills.	Location of oil and lubricant spills onsite or downstream of construction site	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
7.3.1.2 Air Pollution	i) Sensitisation of local residents will be undertaken prior to the start of the construction works. It will be particularly important to: – Inform local residents of the timing and duration of the construction activities for specific channel sections and any uncertainties or potential for change; – Provide them with an understanding of the potential sources of exhaust emission and fugitive dust and odour from excavation works..	Community members aware of causes, sources, extent, and implications of air pollution	Number of complaints of excessive fumes or dust registered. Levels of dust and fugitive emissions released to the atmosphere as a result of construction activities	Before construction period.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	5,000,000
	ii) Delivery vehicles will be switched off when not in use so as to minimize the release of fugitive emissions;	Minimize risk of release of fugitive emissions	Number of complaints of excessive fumes registered. Levels of emissions released to the atmosphere as a result of faulty equipment (determined through air quality measurements).	Throughout construction period. Twice every season, during construction period.	Contractor	KCCA Engineering and Technical Services Directorate NEMA	No direct cost
	iii) Contractor's vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimise potential emissions.	Minimize risk of release of fugitive emissions	Number of complaints of excessive fumes registered. Levels of emissions released to the atmosphere as a result of faulty equipment (determined through air quality measurements).	Throughout construction period Monthly every dry season, during construction period.	Contractor	Supervising Consultant; KCCA Engineering and Technical Services Directorate	Covered in 7.3.1.1 (x)

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	iv) Trucks delivering materials will be covered (with tarpaulin for example) to reduce the risk of fugitive dust emissions, especially in busy residential and commercial areas;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate NEMA	Covered in **7.3.1.1 (vi)**
	v) Waste from site to be transported by licensed companies for waste transportation. The trucks should be appropriately covered to minimize the problem of odour during transportation. Similarly, any excavated silt that has been identified as having an odour, or categorized as hazardous to be appropriately handled by companies licenced to transport and dispose of hazardous waste.	Minimize risk of exposure of workers and general public to odourous material.	Number of complaints registered from residents in Project area. Levels of emissions released to the atmosphere as a result of fugitive emissions (determined through air quality measurements).	Throughout Construction period. Monthly every dry season, during construction period.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate; KCCA Labour Officers	Covered in 7.2.2.2.1 (ii) and in air quality monitoring costs (included in Contractor's cost)
	vi) Delivery vehicles will be restricted to stabilised areas on site as far as practicable, to reduce dust generation and sediment tracking onto local roads;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area. Levels of emissions released to the atmosphere as a result of fugitive emissions (determined through air quality measurements).	Throughout construction period Monthly every dry season, during construction period.	Contractor	KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
	vii) Strategically locate temporary material stock pile areas in the proximity of the construction sites to reduce the haulage distance, and therefore levels of dust and exhaust emissions.	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area. Levels of emissions released to the atmosphere as a result of fugitive emissions (determined through air quality measurements).	Throughout construction period Monthly every dry season, during construction period.	Contractor	KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
	viii) Suitable controls will be implemented for exposed stockpiles and unsealed construction areas (for example covering or spraying with water), as appropriate, to minimise dust;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area Levels of emissions released to the atmosphere as a result of fugitive emissions (determined through air quality measurements).	Throughout construction period Monthly every dry season, during construction period.	Contractor	KCCA Engineering and Technical Services Directorate NEMA	Included in 7.3.1.1 vi)
	ix) Vegetation clearing will be limited to the minimum required for safe construction to minimise exposed areas and vegetation removal;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate NEMA	No direct cost
	x) Exposed areas to be stabilised as soon as reasonably practicable, and seeding and planting for landscaping to be done;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area	Throughout construction period	Contractor; Supervision Consultant;	KCCA Engineering and Technical Services Directorate NEMA	Included in Landscaping Contractor's budget

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	xi) Regular removal or wash away of construction dirt from sections of adjoining roads;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area Location of road sections	Throughout construction period	Contractor; Supervision Consultant;	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	xii) Watering of access roads e.g. with use of a water bowser, will be undertaken in areas where people reside along heavily used sections which are prone to dust generation.	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area	Throughout construction period	Contractor; Supervision Consultant;	KCCA Engineering and Technical Services Directorate	30,000,000
	xiii) There will be no open burning of waste resulting from project construction activities.	All construction and hazardous waste collected by a registered NEMA-approved waste collection company and disposed of in approved sites. No emissions such as smoke and fumes from open burning of waste from construction activities	Number of complaints registered from residents in Project area Levels of emissions released to the atmosphere as a result of fugitive emissions (determined through air quality measurements).	Throughout construction period. Quarterly throught construction period.	Contractor; Supervision Consultant;	KCCA Engineering and Technical Services Directorate NEMA	10,000,000
	xiv) KCCA's grievance management procedure will be implemented to enable local communities along the channels to report nuisance issues and for these to be addressed in a timely manner.	Local community members' complaints addressed in a timely manner.	Record of complaints received including, starting from when they are logged in until they are closed	Throughout construction period	Contractor; Supervision Consultant;	KCCA Engineering and Technical Services Directorate	Included in KCCA annual budget
	xv) Project implementation shall ensure that excavation activities and lining of the channels are carried out expeditiously to reduce on the public exposure time to foul odour.	Shortened time of exposure to the foul smell from the excavation works	Record of complaints on foul smell	Throughout the construction period	Contractor	KCCA Directorate of Public Health and Environment	
	xvi) Stockpiling of the excavated materials to drain before haulage should not be located around or close to the residential areas to reduce excessive exposure to the smell.	Limited or no smell from the stockpiled excavated materials	Record of complaints on the foul smell from the stockpiled materials	Throughout the construction period	Contractor	KCCA – Directorate of Public Health and Environment, and The Supervision Consultant	Contractor's Budget

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7.3.1.3 Disturbance due to Noise Pollution and Vibration	i) Sensitisation of local residents will be undertaken prior to the start of the construction works. It will be particularly important to: – Inform local residents of the timing and duration of the construction activities for specific channel sections and any uncertainties or potential for change; – Provide them with an understanding of what is involved, including the nature of earth moving activities (excavation and compaction works plus grading) and perception vibration and associated risk to safety.	Community members aware of causes, sources, extent, and implications of noise pollution and vibration	Number of complaints of excessive noise and vibration	Before and throughout construction period	Contractor; Supervision Consultant;	KCCA Engineering and Technical Services Directorate	Covered in 7.3.1.2 (i)
	ii) The Contractors on site must be aware of, and adhere to, the regulatory noise limits for a construction site in a commercial area (75 dBA) and that in a residential area (60 dBA) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003. The Contractors and workers should be especially mindful when carrying out construction near sensitive receptors such as schools, clinics and places of worship;	Keep noise levels at construction sites within permissible limits	Record of noise measurements Number of complaints of excessive noise registered. Levels of noise (determined by measurement	Throughout construction period Daily during busy construction time, particularly when heavy machinery is in use.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	25,000,000
	iii) Construction workers must be provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise. This PPE must be worn near any equipment that causes noise levels of 85 dBA or more.	Minimize risk of hearing impairment of construction workers due to Project activities to ALARP	Number of complaints of hearing related incidents Levels of noise (determined by measurement)	Throughout construction period. Daily during busy construction time, particularly when heavy machinery is in use.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	10,000,000
	iv) Construction activities will be limited to daytime, especially in residential areas to minimize disturbance of residents.	Residents near construction sites not disturbed. Keep noise levels at construction sites within permissible limits.	Number of complaints of excessive noise registered. Levels of noise (determined by measurement)	Throughout construction period Daily during busy construction time, particularly when heavy machinery is in use.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	No direct cost

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	v) Construction works near public institutions such as schools should be harmonized with school programmes to consider works during holidays and weekends.	Keep noise levels at construction sites near public institutions within permissible limits, and as low as reasonably practicable.	Number of complaints of excessive noise registered. Levels of noise (determined by measurement)	Throughout construction period Daily during busy construction time, particularly when heavy machinery is in use.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	vi) The proposed project contractor will be contractually required to select and operate plant and equipment with appropriate mufflers and noise controls, and to adopt work practices which would minimize noise impacts to as low as reasonably practicable.	Residents near construction sites not disturbed. Keep noise levels at construction sites within permissible limits.	Number of complaints of excessive noise registered. Levels of noise (determined by measurement)	Throughout construction period Daily during busy construction time, particularly when heavy machinery is in use.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	vii) Regular care and maintenance of vehicles and equipment must be undertaken to ensure they run smoothly as per manufacturer's specifications so as to minimize emissions of noise.	Keep noise levels at construction sites within permissible limits.	Number of complaints of excessive noise registered.	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate NEMA	Included in 7.3.1.1 (x)
	viii) Project machines and vehicles should be turned off when not in use	Keep noise levels at construction sites within permissible limits.	Number of complaints of excessive noise registered.	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate NEMA	No direct cost
	ix) Should noise complaints be received, noise monitoring will be undertaken by the contractor and if measured noise levels exceed legislative limits then measures will be taken to reduce the noise at source or through attenuation. In addition, KCCA will liaise and work with the affected receptors to determine a mutually acceptable way to proceed.	Keep noise levels at construction sites within permissible limits.	Number of complaints of excessive noise registered. Records of noise monitoring results(determined by measurement)	Throughout construction period Daily during busy construction time, particularly when heavy machinery is in use.	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	Covered in 7.3.1.3 (ii)
	x) Works scheduling should ensure that no operations are undertaken over the weekends or at least use of heavy equipment is regulated most particularly on Sundays when a great majority of local community members are expected to be home	Noise levels from the construction equipment kept very low when most of the members are expected to be at home	Noise monitoring records	Occasionary during the Weekend and public holidays	Contractor, Supervising Consultant	KCCA	Inlcuded in the Contractor's costs

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
7.3.1.4 Improper Management of Construction Waste	i) A Waste Management Plan will be prepared to ensure that measures for handling all Project-generated waste are in place. The Contractor and sub-contractors will be obligated to ensure responsible waste management, for example collection of waste by an approved waste contractor who will dispose of waste to a licensed area/ landfill. It should be considered that in some sections, the silted material could be hazardous, particularly areas within and downstream of industrial areas and slums. Silt in such locations should be tested, and if found to be hazardous, should be handled by a licensed waste contractor for hazardous waste.	Proper management of construction waste. Minimization of risk to workers' and community health to levels that are as low as reasonably practicable.	Submitted waste management plan with adequate acceptable measures. Records from licenced waste contractor with logs on source of waste, weight, final destination of waste, handling of waste at final disposal point.	Prior to construction commencement	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	ii) The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle.	Implementation of an integrated solid waste management system i.e. reduction at source, reuse and recycle.	Waste segregation at construction sites. Availability and implementation of waste handling procedures at sites. Number of complaints of dumping Project waste in unlicensed areas registered.	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
	iii) Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage.	No littering of Project waste during haulage to authorized disposal sites	Number of complaints registered about waste disposal during haulage.	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate	Covered in **7.3.1.1 (vi)**
	iv) Construction waste shall not be left in stockpiles along roads, but removed and reused or disposed of on a regular basis.	Proper management of construction waste	Number of complaints of dumping Project waste in unlicensed areas registered.	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate	Covered in 7.3.1.2 (xi)
	v) Human waste will be properly managed through provision of onsite portable toilets, with consideration for the number of workers on site during construction. Separate toilets will be provided for female workers.	Proper disposal of excreta produced by Project personnel	Number, ratio and location of toilets available for use by Project personnel on site. Number of complaints registered about improper waste disposal by community residents.	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	5,000,000
	vi) Any hazardous wastes generated by construction activities (e.g. emptying pit latrine contents) will be collected and transported off site by a licensed waste carrier to the appropriate licensed waste storage facility (NWSC treatment plants) for treatment prior to final disposal.	All hazardous waste generated by the Project is handled in a manner that reduces any associated health risks to a level that is as low as reasonably practicable	Number of complaints registered about improper waste disposal by community residents. Increase in number of sanitation-related diseases since the start of the Project.	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	45,000,000

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
7.3.1.5 Impact on Ecological Environment	i) No permanent wetland ecosystem conversion to channel corridor will occur as per the Project designs. Where the channel interfaces the wetlands along the Gabba and Kansanga Channels, a bell-mouth structure will be constructed to enable the release of stormwater into the wetland system for the natural sequestration by the wetland systems. This will avoid direct release of contaminants into Lake Victoria.	Minimum impact on wetland ecology	Extent of channel corridors through wetlands	Throughout construction period	KCCA Engineering and Technical Services Directorate	Wetlands Management Department (WMD), Ministry of Water and Environment (MWE)	Included in DWD operational budget
	ii) Overall, KCCA will carry out vigorous monitoring activities to ensure that no works occur in intact wetland ecosystems beyond the planned extents.	No Works observed beyond the extents as defined by the designs	Monitoring reports	Throughout the Construction period	KCCA- Directorate of Public Healn and Envionment	NEMA, Department of Wetland Management	8,000,000
	iii) The Supervision Engineer shall recruit a competent environmentalist and carry out regular monitoring of construction Works to ensure that the project does not extend into wetlands. The consultant will submit regular site checks and submit timely communication in the event of non-compliance.	Monitoring reports	No of monitoring reports	Construction period	KCCA –Directorate of Pubic Health and Environment	KCCA	Included in Contractor's cost
	iv) The Consultant and Client (KCCA) will review and approve the Contractor's Environmental and Social Management Plan during the preconstruction phase before it's transmitted to the Bank for further approval. No Works wll commence before a comprehensive ESMP is prepared and approved	Approved C-ESMP	No. of reviews made to the C-ESMP	Preconstruction period	KCCA –Directorate of Pubic Health and Environment, Supervising Consultant	KCCA	Included in Contractor's cost
	v) The Client KCCA will conduct spot-checks on the Contractor to ensure that the project Works are limited to the drainage designs and the general non-conformances are identified.	Non-Conformance truckers	Number of Non-conformance truckers	Throughout the Construction period	KCCA- Directorate of Pubic Health and Environment	KCCA	As part of KCCA's operating costs
	vi) Wetlands will first be inspected to identify if there are any breeding sites or nesting areas, and if possible try to avoid them or minimize vegetation clearance in such areas.	Impact on ecology in Project area minimized to as low as reasonably practicable, and breeding or nesting areas avoided during Project implementation	Number and location of breeding sites or nesting areas	Prior to vegetation clearance in preparation for Project implementation	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	vii) Competent personnel including an environmentalist with knowledge of ecology will be included among Supervising Consultant's team, to ensure constant monitoring, especially during the vegetation clearance stage. Equipment will not be allowed beyond the extent specified in the designs/drawings especially where the risk of degading wetlands is likely to be high. This will help reduce or avoid damage to the flora and fauna from Project implementation. Any chance finds in this regard will be repoted to the Ecologist who will provide guidance on the appropriate action	Impact on ecology in Project area minimized to as low as reasonably practicable, and breeding or nesting areas avoided during Project implementation	Number and location of breeding sites or nesting areas	Prior to vegetation clearance in preparation for Project implementation	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	Included in Supervising Consultants' cost
	viii) To further minimise the potential impact on the degraded Lubigi wetland, the proposed initial width of Lubigi channel will be reduced from 160m to 100m as illustrated in Figure 7-16. KCCA will however aquire the entire 160m width corridor and protect it from further degradation. Concrete pillars will be established to demarcate the acquired wetland section for strict protection from encroachment.	Revised design for the reduced extent of the channel. No. of concrete pillars procured for demarcating the wetland section recovered from the review of the Lubigi primary channel design.	Extent of the acquired degraded wetland section protected from further encroachment	During the Construction Phase	Contractor, Supervising COnsultatn, KCCA	KCCA – Directorate of Public Health and Environment	Included in Contractor's cost
	ix) The Contractor must avoid the impediment to water flow in the channels during and after construction work.	Impact on ecology in Project area minimized to as low as reasonably practicable	Occurrences of impediment to water flow, especially in wetland areas	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate	Included in Contractor's cost
	x) During construction, habitat disturbance should be minimized as much as possible. To minimize death, vegetation clearance should always be done first, as this scares away some amphibians and reptiles, as opposed to direct use of graders to clear land, or direct dumping of construction materials and excavated soils.	Impact on ecology in Project area minimized to as low as reasonably practicable	Occurrences of injured or dead amphibians and reptiles in Project area, that could be attributed to Project activities	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
	xi) The construction workforce should be encouraged and sensitised not to harass herpetiles.	Impact on ecology in Project area minimized to as low as reasonably practicable	Occurrences of injured or dead amphibians and reptiles in Project area, that could be attributed to Project activities	Throughout construction period	Contractor	KCCA Engineering and Technical Services Directorate, & NEMA	Included in Contractor's cost
	xii) The contractor must not dump construction waste in the wetlands.	Impact on ecology in Project area minimized to as low as reasonably practicable	Occurrences of injured or dead amphibians and reptiles in Project area, that could be attributed to Project activities	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate, and NEMA	Covered in 7.3.1.2 (xi)

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated cost for Project duration (Uganda Shillings)
	xiii) People currently extracting from these wetlands will be monitored and controlled to work with the regulatory framework so as to maintain the status and habitat quality of these wetlands.	Impact on ecology in Project area minimized to as low as reasonably practicable	Occurrences of injured or dead amphibians and reptiles in Project area, or destruction of habitat that could be attributed to Project activities	Throughout construction period	Contractor; Supervising Consultant	KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
	xiv) Authorities responsible for the protection of wetland resources such as NEMA and WMD should clearly demarcate the boundaries of wetlands, and also enforce the protection of these wetlands such that destruction or conversion of this important resource is curtailed.	Impact on ecology in Project area minimized to as low as reasonably practicable	Occurrences of injured or dead amphibians and reptiles in Project area, or destruction of habitat that could be attributed to Project activities	Throughout construction period	NEMA and WMD	NEMA and WMD	Included in NEMA and WMD annual budgets
	xv) Restoration of any access roads will be done by the Contractor, particularly in the wetlands.	Restoration of project site to similar or better state, compared to pre-project conditions	Evidence of Project activities in the wetlands after construction activities	03 months to 01 year after construction phase	Contractor	KCCA Engineering and Technical Services	Included in Contractor's cost
Total						**UGX**	**597,000,000**

8.3.3 Post Construction (Operation and Maintenance) Phase

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
7.4.1 POSITIVE IMPACTS – SOCIO-ECONOMIC ENVIRONMENT							
7.4.1.1 Improved Storm water drainage	I) Construction material and methods will be according to design standards such as those for Roads and Bridges so as to ensure that the drainage system infrastructure is efficient throughout the design life.	Reduced flooding occurrences in the City during rainy seasons	Functionality of culvert crossings and drainage channel infrastructure	Throughout O&M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	II) Establishment of access roads along the project sites will enhance KCCA's ability to improve the solid waste management. This way, KCCA will reduce or contain the blockage of culverts and drainage channels by garbage. A community Waste Management system shall be streamlined through local community leadership and KCCA waste management teams to control against the accumulation of solid waste materials along the project sites.	No garbage in City's drainage infrastructure	Functionality of culvert crossings and drainage channel infrastructure	Throughout O&M period	KCCA Waste Management Division	KCCA Public Health Services and Environment Directorate; KCCA Solid Waste Management Teams	Included in KCCA annual operational budget
	III) The respective KCCA Waste Management Teams in the Divisions will run campaigns periodically to engage communities and sensitize on the available programmes for improving waste management. KCCA supports community inititatives for clean ups, which are led by Sanitation Committees in the villages.	No garbage in City's drainage infrastructure	Functionality of culvert crossings and drainage channel infrastructure	Throughout O&M period	KCCA Waste Management Division	KCCA Public Health Services and Environment Directorate; KCCA Solid Waste Management Teams	Included in KCCA annual operational budget
	IV) Development of a Policy or Bylaw by KCCA to encourage rain water harvesting in the City, so as to reduce on the volume of run-off to be conveyed through the channels.	Reduced volume or runoff in City	Percentage of structures with functional water harvesting systems	Throughout O&M period	KCCA Legal Team	KCCA Top Management	Included in KCCA annual operational budget
	V) Development of a Policy or Bylaw by KCCA to encourage the planting of vegetation (grass, shrubs, flowers) to reduce the bare surface area in the City, and in effect reduce siltation in the channels.	Reduced volume or runoff in City	Reduced number of developments with 80-100% impermeable surfaces on the outside.	Throughout O&M period	KCCA Legal Team	KCCA Top Management	Included in KCCA annual operational budget
	VI) Regular maintenance works by KCCA to ensure that the channels are always in proper working condition, and thus avoid the current state of blocked or broken culverts.	Improved functionality of drainage infrastructure at all times	Channel siltation Blocked or broken culverts Functionality of drainage infrastructure	Throughout O&M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	VII) Swales will be integrated into the City's tertiary and quaternary drainage channels in an effort to improve the quality of water conveyed into and through the secondary and primary channels	Improved quality of water conveyed through City's storm water channels	Quality of water of receiving streams such as Lake Victoria near Primary channel outflows (through water quality tests	Once every season Throughout O&M period	KCCA Drainage Division	Ministry of Water and Environment, Department of Water Resources Management (DWRM)	Included in KCCA annual operational budget
	VIII) A mega sensitisation campaign in the	No encroachment on	Percentage of installed channel	Throughout O&M	KCCA Public	KCCA Drainage Division	Included in KCCA

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	City to encourage respect of the drainage channel corridor for access for maintenance purposes, and wetlands for flood retention purposes.	drainage channel corridors	corridors still intact since end of construction phase	period	Relations Office		annual operational budget
	IX) Sanitation Committees will be selected at the village level to encourage community involvement and participation in keeping the City clean. KCCA piloted the use of '*bulungi bwansi*' drives in cleaning up some areas in the City. Following the success of such drives, KCCA will roll out similar campaigns throughout the City.	Community engagement in maintaining City cleanliness and improved management of solid waste.	Channel siltation Blocked or broken culverts Functionality of drainage infrastructure	Throughout O&M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	X) KCCA, with the assistance of area local leaders will implement stringent fines on improper garbage disposal, inorder to discourage irresponsible waste disposal.	Community engagement in maintaining City cleanliness and improved management of solid waste.	Channel siltation Blocked or broken culverts Functionality of drainage infrastructure	Throughout O & M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
7.4.1.2 Improved Community Health and Safety	I) Regular maintenance works will be undertaken by KCCA to ensure that the channels are always in proper working condition, and thus avoid the current state of blocked or broken culverts.	Reduced occurrences of stagnant water in drainage channels	Functionality of culvert crossings and drainage channel infrastructure	Throughout O&M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	II) Regular sensitisation campaigns in the City will be undertaken to encourage respect of the drainage channel corridor for access for channel maintenance purposes.	Respect of the channel corridor by residents and land owners along the channels in the Project area	Indication of encroachment on channel corridor	Throughout O&M period	KCCA Public Relations Office	KCCA Engineering and Technical Services Directorate WMD (in and around wetlands)	Included in KCCA annual operational budget
	III) Integration of a solid waste management program with the drainage Project to reduce the risk of blocked culverts as a result of garbage disposal into the drainage channels, or open dumping which results in garbage being carried into the channels by storm water.	No garbage in City's drainage infrastructure	Functionality of culvert crossings and drainage channel infrastructure	Throughout O&M period	KCCA Waste Management Division	KCCA Public Health Services and Environment Directorate	Included in KCCA annual operational budget
7.4.1.3 Access Roads for Maintenance	I) The access roads will be regularly maintained to allow for ease of movement of trucks used for drainage maintenance activities.	Ability to access entire channel lengths for maintenance works such as de-silting, and collection and disposal of de-silted material	Channel siltation Functionality of drainage infrastructure Clearance of access roads	Throughout O&M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	II) Markers that indicate the extent of the channels will be maintained in working order to enhance community safety and minimize the risk of falling into the channels.	Zero incident rate regarding use of channels by local communities and general public	Number of safety incidents in or near drainage channels, particularly during rainy seasons	Throughout O&M period	KCCA Drainage Division	KCCA Public Health Services and Environment Directorate	Included in Project construction budget
	III) Regular maintenance of the green reflective paint at a level above maximum possible flood	Zero incident rate regarding use of channels	Number of safety incidents in or near drainage channels, particularly	Throughout O&M period	KCCA Drainage Division	KCCA Public Health Services and	Included in Project construction

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	height (along walkway extents) and red reflective paint also at a height above possible flood level (on bollards along the channel edges)	by local communities and general public	during rainy seasons			Environment Directorate	budget
	IV) Replacement of 300 mm high kerb stones on the periphery of the drainage corridor as well as at corridor entrances at major roads, as required during the life of the Project.	Prevention of the use of channel access roads by opportunistic motorists such as errant commuter taxi drivers	Number of non-Project vehicles using the access road	Throughout O&M period	Maintenance Contractor	KCCA Drainage Division	Included in KCCA annual operational budget
	V) Replacement of 500 mm high concrete bollards at about 25 m intervals along the channel edges, as required during the life of the Project in order to guard against encroachment of the 3 m access roads along the channels,.	Access road width kept free from encroachers	Number of encroachers in drainage corridor	Throughout O&M period	KCCA Drainage Division	KCCA Engineering and Technical Services Directorate KCCA Legal Directorate	Included in KCCA annual operational budget
	VI) Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.	Zero incident rate regarding use of channels by local communities and general public	Number of safety incidents in or near drainage channels, particularly during rainy seasons	Throughout O&M period	KCCA Drainage Division	KCCA Public Health Services and Environment Directorate	Included in KCCA annual operational budget
	VII) Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.	Respect of drainage channel corridor and infrastructure by local community and general public	Physical condition of drainage infrastructure	Throughout O&M period	Respective KCCA Urban Division – Engineering Department	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	VIII) Maintenance of speed restriction measures including humps and posted speed limits of 40 km/hr for light vehicles and 30 km/hr for heavy vehicles along access roads to the channels especially when they are traversing communities.	Recommended speed limit observed by maintenance vehicles. Zero incident rate, especially for local communities and general public along the channels and access roads	Number of safety incidents in or near drainage channels, particularly during rainy seasons	Throughout O&M period	Maintenance Contractor	KCCA Drainage Division	Included in KCCA annual operational budget
7.4.1.4 Improvement of Community Access across the Channels	I) The channel crossings markings/ demarcations/ signage need to be refurnished, as required, to indicate the ones that are for only pedestrian traffic, those that can be used by bikes and motorcycles and general traffic. The reflective strips installed along ends of the crossings for only pedestrians should also be refurnished, as required during the life of the project.	Zero incident rate, especially for local communities and the general public along the channels and access roads	Number of safety incidents in or near drainage channels, particularly during rainy seasons	Throughout O&M period	Maintenance Contractor	KCCA Drainage Division	Included in KCCA annual operational budget
	II) Repair and maintenance of side rails, as required, along the channel crossings to enhance community safety and minimize the risk of falling into the channels will be refurnished.	Zero incident rate regarding use of channels by local communities and general public	Number of safety incidents in or near drainage channels, particularly during rainy seasons	Throughout O&M period	Respective KCCA Urban Division – Engineering Department	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	III) Community sensitization to allow proper usage	Zero incident rate	Number of safety incidents in or	Throughout O&M	Respective KCCA	KCCA Engineering and	Included in KCCA

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	of the crossing points and avoid accidents when crossing after a heavy downpour.	regarding use of channels by local communities and general public	near drainage channels, particularly during rainy seasons	period	Urban Division – Engineering Department	Technical Services Directorate	annual operational budget
	IV) Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.	Respect of drainage channel corridor and infrastructure by local community and general public	Physical condition of drainage infrastructure	Throughout O&M period	Respective KCCA Urban Division – Engineering Department	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
7.4.1.5 Channel Beautification	I) Maintenance of landscaping along the sections of the channel to soften the hard (concrete) landscape brought about by the channels	Beautification of the areas along the drainage channels	Aesthetics of drainage channel corridors	Throughout O&M period	Landscaping Contractor	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	II) Repair and maintenance of benches and seating areas provided to allow the community use the space for leisure parks.	Beautification of the areas along the drainage channels. Maximize use of drainage channel corridors.	Aesthetics of drainage channel corridors. Number of community members making use of community areas within corridors.	Throughout O&M period	Landscaping Contractor	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	III) Repair and maintenance of walk ways, jogging and bike lanes provided within these landscaped spaces to allow for community utilization of these public spaces.	Gainful use of channel corridors by local communities and the general public	Number of community members making use of community areas within corridors.	Throughout O&M period	Landscaping Contractor	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	IV) Maintenance and promotion of use of spaces in selected areas for utilization in specific commercial activities such as tree and flower beds.	Gainful use of channel corridors	Revenue from commercial activities accepted within the channel corridors	Throughout O&M period	Landscaping Contractor	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	V) Provision and regular emptying of trash bins and undertaking of waste management awareness campaigns to reduce or even eliminate the chance of waste ending up in the drainage channels.	Drainage channels devoid of plastic waste and garbage	Number of blocked, or near blocked channels due to waste accumulation.	Throughout O&M period	Landscaping Contractor	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
7.4.2 NEGATIVE IMPACTS - SOCIO-ECONOMIC ENVIRONMENT							
7.4.2.1 Loss of income from Project-related activities	I) All people taken on to work on this Project will be informed about its duration and phasing beforehand, so that they can plan accordingly.	All Project workers aware of Project duration and phasing to enable proper planning of individual finances	Occurrences of workers unaware of the Project's duration and phasing	Throughout O&M period	Contractor Consultant Directorate Engineering and Technical Services, KCCA	KCCA	Included in Contractor's cost
	II) The KCCA Supervising Engineers will take note of Consultants, Contractors and sub-contractors that produce quality work, in line with their contracts and industry best practice during the construction phase, and prioritize them for available maintenance work during the life of the Project. This will also serve to ensure that	Consultants, Contractors and sub-contractors that produce quality work, in line with their contracts and industry best practice during the construction phase, prioritized for	O&M works being done to required quality, thus contributing to desired efficiency of drainage channels	Throughout O&M period	KCCA Engineering and Technical Services Directorate	KCCA Procurement Directorate	Included in KCCA annual operational budget

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	the skills training obtained during the Project construction is taken advantage of.	available maintenance work during the life of the Project.					
	III) Unskilled labourers taken on from the local communities surrounding the drainage channels will be kept on for maintenance works of the channel, where possible. This will serve to further increase the sense of ownership of the Project within the local communities, and hence sustainability of the drainage infrastructure.	Unskilled labourers taken on from the local communities surrounding the drainage channels kept on for maintenance works of the channel, where possible.	Number of O&M workers from the local communities surrounding the drainage channels	Throughout O&M period	KCCA Engineering and Technical Services Directorate	KCCA Procurement Directorate	Included in KCCA annual operational budget
	IV) Where feasible, upon discussion with the local area leaders, committees will be selected along the densely populated sections along the channels with the aim of promoting vigilance against garbage disposal into the channels and vandalism of drainage infrastructure.	Reduction in occurrence of blocked channels due to garbage being dumped directly into or areas near the channels	Existence of Drainage committees within the local communities surrounding the drainage channels	Throughout O&M period	KCCA Division Ward Administrators	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
7.4.2.2 Risks to Community Health and Safety	I) The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. The crossings for only pedestrians should have bollards with reflective strips installed at the ends to strict access to other traffic.	Minimize risk of exposure of community members to safety incidents to ALARP	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout O&M period.	KCCA Division Engineers	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	II) Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels.	Minimize risk of exposure of community members to safety incidents to ALARP	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout O&M period.	KCCA Division Engineers	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	III) Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.	Minimize risk of exposure of community members to safety incidents to ALARP	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Throughout O&M period.	KCCA Division Ward Administrators	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget
	IV) Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.	Safety aspects of the drainage channel infrastructure remaining intact and being repaired regularly to ensure community H&S	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of	Throughout O&M period.	KCCA Division Ward Administrators	KCCA Engineering and Technical Services Directorate	Included in KCCA annual operational budget

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
			Project activities.				
7.5.2 POSITIVE IMPACTS - BIOPHYSICAL ENVIRONMENT							
7.5.1.1 Restoration and Protection of Wetlands	l) The extent of wetlands will be clearly demarcated by beacons to mark the wetlands buffer zone.	Minimisation of wetland encroachment to ensure full ecological and water retention value is maintained	Reports or evidence of encroachment	Throughout O&M period	WMD	NEMA	Included In WMD annual operational budget
	ll) A wetlands restoration programme will be embarked upon, starting with the major wetlands in the City.	Wetlands restored to their pre-1995 conditions, or better (*Note: The Cabinet Directive regarding land title holders in wetlands was that titles obtained after 1995 were illegal)*	Improvement of the wetland conditions with comparison the pre-1995 conditions	Throughout O&M period	WMD	NEMA	Included In WMD annual operational budget
	lll) The Project monitoring Programme will include an annual assessment of the functionality of wetlands, and in this way a status of the wetland restoration exercise.	Wetlands restored to their pre-1995 conditions, or better	Improvement of the wetland conditions with comparison the pre-1995 conditions.	Throughout O&M period	WMD	NEMA	Included In WMD annual operational budget
7.5.2 NEGATIVE IMPACTS - BIOPHYSICAL ENVIRONMENT							
7.5.2.1 Air Pollution	i) The vehicles will be switched off when not in use so as to minimize the release of fugitive emissions;	Minimize risk of release of fugitive emissions	Number of complaints of excessive fumes registered. Levels of emissions released to the atmosphere as a result of faulty equipment.	Throughout O&M period	Contractor	KCCA Engineering & Technical Services Directorate NEMA, Wetlands Management Department	No direct cost
	ii) The vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimise potential emissions.	Minimize risk of release of fugitive emissions	Number of complaints of excessive fumes registered. Levels of emissions released to the atmosphere as a result of faulty equipment.			KCCA Engineering and Technical Services Directorate NEMA	10,000,000 per year
	iii) Trucks carrying away the dredged silt and garbage will be covered with tarpaulin to reduce the risk of fugitive dust emissions, especially in busy residential and commercial areas;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area			Directorate of Engineering and Technical Services KCCA NEMA	2,000,000 per year
	iv) Heaps of the garbage and silt and the channel will not be piled near the channels since this is a potential source of dust in dry seasons;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area			KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	v) Vegetation clearing along the channels will be limited to the minimum required so as to minimise exposed areas and vegetation removal;	Minimize nuisance of dust emissions in residential and busy commercial areas	Number of complaints registered from residents in Project area			KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
	vi) There will be no open burning of waste from the channels as is being currently done.	All waste collected by a registered NEMA-approved waste collection company and disposed of in approved sites. No emissions such as smoke and fumes from open burning of waste from channel cleaning activities	Number of complaints registered from residents in Project area			KCCA Engineering and Technical Services Directorate NEMA	Included in Contractor's cost
7.5.2.2 Disturbance due to Noise Pollution and Vibrations	i) The Contractors on site must be aware of, and adhere to, the regulatory noise limits for the general environment (55 dBA for day time and 45 dBA for night time in an environment of mixed residential, with some commercial and entertainment) as provided for by the National Environment (Noise Standards & Control) Regulations, 2003. The maintenance workers should be especially mindful when carrying out maintenance works near sensitive receptors such as schools, clinics and places of worship;	Keep noise levels during execution of maintenance works at the drainage channels within permissible limits.	Number of complaints of excessive noise registered. Noise level measurements	Throughout O&M period During work that requires heavy machinery	Maintenance Contractor	KCCA Engineering and Technical Services Directorate NEMA	Included in KCCA annual operational budget
	ii) Maintenance activities will be limited to daytime, especially in residential areas to minimize disturbance of residents.	Residents near drainage channels not disturbed. Keep noise levels during execution of maintenance works at the drainage channels within permissible limits.	Number of complaints of excessive noise registered. Noise level measurements	Throughout O&M period During work that requires heavy machinery	Maintenance Contractor	KCCA Engineering and Technical Services Directorate NEMA	Included in KCCA annual operational budget
7.5.2.3 Improper Management of Project-generated Waste	iii) A waste management plan will be developed by the Maintenance Contractors, and approved by KCCA to ensure that measures for handling all Project-generated waste are in place. The Contractor and sub-contractors will be obligated to ensure responsible waste management, for example collection of waste by an approved waste contractor who will dispose of waste to a licensed area/ landfill.	Proper management of Project-generated waste	Number of complaints of dumping Project waste in unlicensed areas registered.	Throughout O&M period	Maintenance Contractor	KCCA Engineering and Technical Services Directorate Respective KCCA Urban Division Office	Included in KCCA annual operational budget

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	iv) Waste transportation vehicles will be covered to avoid spillage or waste getting blown off transportation vehicles during haulage.	No littering of Project waste during haulage to authorized disposal sites	Number of complaints registered about waste disposal during haulage	Throughout O&M period	Maintenance Contractor	KCCA's Directorate of Engineering and Technical Services, Directorate of Public Health & Environment	Included in KCCA annual operational budget
7.5.2.4 Impact on water resources and hydrology	i) The quantity and quality of stormwater reaching the channels must be reduced within the catchment. Implementation of an integrated catchment management plan (ICMP) would be an effective undertaking. Thus KCCA will implement an ICMP that includes: **A.** Encouraging rainwater harvesting: temporary storage of excess runoff so that release of runoff from properties during a storm is controlled by imposing mandatory storm water retention or detention facility within the premises. Building codes to include storm water storage should be introduced – consideration should be given to enforcement by a relevant by-law(s). **B.** Greening of yards rather than paving by impervious surfaces. **C.** Promoting water use efficiency. **D.** Improved sanitation systems. **E.** Upgrading tertiary drainages and community accesses. **F.** Implementing the principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle. **G.** Strict demarcation and protection existing wetlands in Kampala City. **H.** Provisions to be made for floodplain zoning and regulation for land use changes – some areas will be prohibited for developments and left out for flood control. **I.** Provisions to be made for development of a compatible and coordinated storm water drainage system in Kampala City. ii) The designed channel corridors need to be protected from encroachment. iii) The channels must be regularly and adequately maintained – including replacement of damaged lining, vegetation clearing, de-silting, garbage/debris removal and dredging.	Minimal impact on hydrology and water resources as a result of project development	Sediment and waste debris deposition in the wetlands and receiving water bodies. Monitoring locations water quality trends (water quality tests).	Throughout O&M period. Twice during every rainy season	Maintenance Contractor	KCCA's Directorate of Engineering and Technical Services, Directorate of Public Health & Environment	Included in KCCA annual operational budget

ESIA Reference section and Impact	Mitigation/Enhancement commitments	Desired Outcomes	Monitoring: Performance Indicators/Targets or Acceptance Criteria	Timing/Frequency	Responsibility	Monitoring Institution and Personnel	Estimated annual cost (Uganda Shillings)
	v) KCCA will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the drainage channels in this Project will have an impact on the downstream receiving bodies. In particular KCCA will: ✓ Tailor any developments in the City in line with the existing wetland management plans and in close consultation wit NEMA and WMD. ✓ Consult WMD and NEMA before approving any developments in demarcated and non-demarcated wetlands. Close cnd indiscriminate application of a stringent system of approval will greatly minimize the loss of wetlands to developers. ✓ Partner with the NEMA and WMD on regular sensitization of people in Kampala on the benefits of protecting natural wetland systems, and the dangers of destroying the same. ✓ Partner with the NEMA, WMD and in effect the Environmental Police attached to these Institutios to regularly monitor the demarcated sections of wetland so as to dissuade encroachment on wetlands. Since KCCA has a presence in most parts of the City, with the Divisions, Councils and Villahe leadership, it is possible to closely monitor any new developments in wetlands before serious damage is done.	Minimal impact on natural wetlands systems as a result of project development	Sediment and waste debris deposition in the wetlands and receiving water bodies. Water and silt quality tests	Throughout O&M period. Twice during every rainy season	KCCA Engineering and Technical Services Directorate	NEMA and WMD	Included in KCCA, NEMA and WMD annual operational budget
Total						**UGX**	**12,000,000 per year**. (Other costs covered in annual operational maintenance costs)

9 CONCLUSION AND RECOMMENDATIONS

9.1 CONCLUSION

The proposed project is aimed at improvement of priority drainage systems in Kampala Capital City, and is part of the second phase of the Kampala Institutional and Infrastructure Development Project (KIIDP-II). The Project addresses the flooding problem in the City by improvement of three (03) of the eight (08) drainage systems in the City and their secondary channels.

However, this study has identified and described positive and negative impacts that will result from the project development activities. Enhancement measures for the positive impacts and mitigation measures for the negative impacts have been provided taking into consideration of the feedback from stakeholders' consultations. Despite these measures, a number of challenges were identified that could affect the success of this Project in the long term.

One of the identified major challenges for the Project is that the KIIDP II Project is restricted to priority drainage improvements of primary and secondary drains, and the omission of tertiary drains will most likely impede the hydraulic efficiency of the rehabilitated drains by contributing more silt and garbage. However, KCCA, with funding from Government of Uganda, is undertaking the improvement of a number of tertiary drainage channels.

Another challenge for the long term success of this Project is the poor waste management of solid waste in the Project areas, and in the City in general. In most parts, there is a lack of garbage collection and solid waste disposal facilities, which results in garbage disposal in the drains. This problem is likely to continue affecting the rehabilitated drains. Integrated waste management was noted to be a critical requirement for not only optimum operation of the drainage system, but also for the effectiveness of the mitigation measures. Thus intra-KCCA departmental coordination and inter-institutional cooperation between KCCA and relevant agencies including NEMA, WMD, DWRM and NWSC will be required during project implementation.

Another of the major challenges to the implementation of the Project was identified as the amount of land take required, considering the population density within the areas along the channels. The issue of compensation is a very sensitive one and acceptance of the Project greatly depends on how this process of land acquisition will be conducted. A number of the sections within the Project area are within low lying areas that are close to the wetlands. The fact that these areas are not formally designated as wetlands is a cause of concern for the residents, who are adamant that they should be compensated, while the Department of Wetlands insists that people in wetlands should not be compensated. KCCA needs to continue engaging with the responsible agencies of Wetlands Management Department, National Environment Management Authority, and Office of the Chief Government Valuer in the Ministry of Lands, Housing and Urban Development in order to reolve this 'grey area' before site handover and Project implementation. Despite this 'grey area', it should be noted that the Project Resettlemet Action Plan was developed in line with World Bank OP 4.12 and as such, all identified Project affected persions were registered as liable for compensation irrespective of the nature of tenure and location of the potentially affected land. The land challenge is worsened by the on-going reclamation of, and construction in wetlands, which will continue to impact the ability of the wetlands to dissipate floods and absorb and purify runoff and discharges, impacting on the water quality of the receiving waters such as Lake Victoria and Lake Kyoga.

If the project is developed and the infrastructure put in place, is operated in conformity with the legal requirements, enhancement measures and mitigations adequately managed as per the ESMMP and annual audits conducted as per the regulatory requirements, the benefits of this project to Kampala City would by far outweigh potential negative effects. It should however, be noted that the costs indicated in the ESMMP are indicative only and the responsible implementing parties such as Contractors, Supervising Consultants, and respective KCCA teams should prepare budgets to include the aspects covered in this ESMMP.

9.2 RECOMMENDATIONS

To ensure that the KIIDP II Project results in a long term solution and indeed improves the drainage systems in the City, a number of measures have to be undertaken by KCCA as the implementing agency. These include:

i. Tertiary drains in the Project are also improved as a lack or inefficieny of these could likely impede the hydraulic efficiency of the rehabilitated drains by contributing more silt and garbage.

ii. Improvement of the solid waste management system in the City since a lack of garbage collection or local solid waste disposal facilities may result in ongoing garbage disposal in the rehabilitated drains.

iii. Working with NEMA and Wetlands Management Department to maintain the wetlands, particularly the sections that are still intact, or not too degraded. It is also necessary for KCCA to agree with NEMA, WM and the Chief Government Valuers' Office about compensation in the wetlands. The World Bank OP 4.12 will have to be applied for this Project.

iv. Ensuring the inclusion and construction of storm water retention ponds in the new developments, as included in the Project designs.

v. Working with the other institutions with planned and on-going development projects within the Project area, such as UNRA and SGR.

vi. Co-ordination between the different departments in KCCA, such as Engineeering, Sanitation, and Planning, to ensure that the challenges to this Project are holistically dealt with.

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